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MANUALS

OF

HEALTH

HEALTH AND  
OCCUPATION

B. W. RICHARDSON, M.D.



ONE SHILLING







MANUALS OF HEALTH.

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ON

HEALTH AND OCCUPATION,

BY

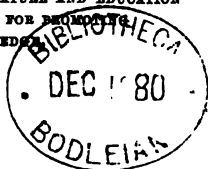
BENJAMIN WARD RICHARDSON, M.D., F.R.S.,  
M.A., LL.D., F.S.A.,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS, AND HONORARY  
PHYSICIAN TO THE ROYAL LITERARY FUND.

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*In Memoriam.*

TO

E. A. PARKES, M.D. F.R.S.

LATE PROFESSOR OF MILITARY HYGIENE IN THE ARMY MEDICAL  
SCHOOL, NETLEY,

AND

ONE OF THE GREAT PIONEERS OF SANITARY SCIENCE OF THIS CENTURY,

*This little Book,*

IN REMEMBRANCE OF A LONG-CHERISHED FRIENDSHIP,  
IS REVERENTLY AND AFFECTIONATELY  
INSCRIBED.

## PREFATORY NOTE.

---

THE space at my command is very limited. I shall therefore waste little time in prefatory observation.

The Manual is divided into four parts.

The first part describes the workers of the community in general, their numbers and the character of their occupations.

The second part indicates some of the injuries to health *indirectly* connected with the occupations of the different classes of workers.

The third part treats on the injuries to health and life *directly* connected with the occupations of the different classes of workers.

The last part endeavours to point out some practical methods by which the life of the different classes of workers may be rendered healthier and longer.

Should the reader become sufficiently interested in the subject of these pages to desire for more detailed information than could be given in so small a work as is here presented, I would refer him to my Lectures on Occupations in Relation to Health and Disease, delivered before the Society of Arts and Manufactures in the Session of 1876; and to my works entitled respectively, "Diseases of Modern Life," "Health and Life," and "A Ministry of Health."

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# ON HEALTH AND OCCUPATION.

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## PART I.—THE OCCUPIED, NUMERICALLY, SOCIALLY, AND PHYSICALLY CONSIDERED.

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### CHAPTER I.

#### THE STUDY OF HEALTH AND OCCUPATION.

**W**HEN we consider the workers in such a great hive of industry as England we find that what may be called the hard workers are engaged in pursuits so widely different in character that no rule bearing on health and occupation can be drawn of a general kind, or which admits of any general application. We are obliged to enter into an immense number of details before we can arrive at such facts as are calculated to give us a clear view of the relationships of life to labour, and we must have a most comprehensive view of the whole subject before we can venture to draw any safe conclusions or to give any sound advice or instruction.

Without entering at any great length into the method of study, I may state that many leading lines of inquiry have to be pursued by the sanitary scholar who would be fairly master of the matter under review.

In the first place he must know how a community, such as that in which we live and labour, is made up,

what are the elements of life and labour in it; how are the ranks of labour laid out and drilled, and how are they supplied and maintained.

In the second place it is necessary to discriminate between the different classes of labour in respect to those kinds which are of themselves injurious to health and life, and those which are not injurious, or which need not be injurious to the employed.

In the third place, in studying the nature and effects of those occupations which are considered to be invariably injurious to health and life, it is essential to know whether the injury that is inflicted is a necessary or unnecessary result of the employment. For it is often found, on close inquiry, that certain occupations which are reputed to be most dangerous, and which from the returns of mortality are rightly considered most dangerous, are rendered so not by any true necessity, but by some removable error which through ignorance or prejudice is suffered to remain.

These three lines of inquiry are of first consequence in the method of study. To them must be added the influences of a purely personal kind which interfere with many views and estimates relating to trades, callings, and professions in their effects on vitality and health. It constantly occurs that many of the evils attributed to a trade or calling, or profession, are found not to belong to it at all when the causes of the evils are carefully looked into. In many instances the work may actually be of itself healthy, while something which the worker does and which has nothing to do with the work at all in the strict and necessary sense of the word, gives to the work an unenviable notoriety.

Once more, in these studies too much thought cannot be given to the circumstances under which the

*The Grand Divisions of Occupations in England. 7*

labour of everyday workers is carried on, I mean to the surroundings of labour of every sort and of every kind. It has happened constantly to me and to other sanitarians to trace the most serious evils to some circumstance which lies outside the work altogether, and which often is removable so soon as it is detected.

Without following any plan that shall make the reading of the present little book so rigidly systematic as to be hard and formal, I shall follow in a general way the outline of study sketched forth in this short chapter. Confining my observations mainly to English workers, I shall try first to present a view of the division of such workers, general and special. From that point I shall enter into particulars respecting some different classes of workers, and bearing upon the circumstances under which such classes are rendered healthy or unhealthy.

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## CHAPTER II.

### THE GRAND DIVISIONS OF OCCUPATIONS IN ENGLAND.

IN England all men and women are workers. In the last returns of the census in 1871, out of the 22,712,266 persons who made up the population of England and Wales, 168,895 persons only returned themselves as persons of rank and property; that is to say, as persons who had no professed occupation, and who lived entirely on their means. Of course, in so large a population there are a great many who are not able to work, owing to feebleness of age or infirmity. But amongst those who are able to work so many are willing to work that the small number I have named, and no more, can fairly be called idlers. Many even

of these would probably tell us, if we knew them, that they too are not idlers, but, in their way, busy.

The fact is worthy of special note, as showing what a hive of industry this island is, and also as indicating what importance attaches to our modes of life, so that health and industry shall go as far as is possible hand in hand.

In the various occupations in which the people of England are employed there are found great differences in respect to health. It behoves us therefore to know what are the leading facts of such varied employments. How are the people divided into different classes of the occupied.

The Registrar-General in his returns on the census of the kingdom,—returns which, by the wonderful labours of Dr. Wm. Farr have been made the most precious treasures of historical knowledge,—has drawn out a system of division for us which is very easily understood and very readily told. The Registrar-General explains that there are six great classes of the community, each of which is composed of different orders.

#### *Class I.—Professional Men and Women.*

The first order of the professional class consists of persons who are concerned purely in carrying out the governing affairs of the kingdom. All civil servants, viz. all persons in the direct employment of the Legislature for governmental purposes, belong to this class, which includes some members of both sexes, and makes up a total of 106,286. Of the members of the class, 99,892 are men and 6,394 are women. This is the *governing order*.

After the governing order come those who are engaged purely in defence of the country and in maintaining public authority. Soldiers come under

this head if they belong to the regular army. The police come under this head, and a few of the sailors who are stationed at home. The order in 1871 numbered 136,491. The members of it all belong to the male sex, and form the *defence order*.

The third order of the professional class includes all those persons who are engaged at what may be called professorial work. The term professorial has now a wide significance, and embraces those who are occupied in the fine arts, in teaching, and in many other pursuits beyond what used to be called strictly the professions of law, physic, and divinity. The members of this order made up a total of 441,325, of whom 249,735 were men, and 191,590 were women; and they are styled the *learned order*.

The sum total of the whole professional class, including the three orders, is 684,102. It should be mentioned that this number includes all persons engaged in the professional work of the country, in science, literature, fine arts, teaching, preaching, doctoring, lawyering, defending, ruling;—or to put the list in the precise terms, all the officers of the National Government, of the Local Government, and of the East-Indian and Colonial Government residing in England; all the men of the army and navy in the country, all the clergymen, ministers, and others connected with religion; all the lawyers and law-stationers; all physicians, surgeons, and druggists; all authors, literary persons, and students; all artists, musicians, actors, teachers, and scientific workers.

The number, it will be said, is too small almost to be believed. It is indeed remarkably small, and when we know how unequally the labour of the professional labourers is divided, how many find little to do, and how many can do little in comparison with others, it is well-nigh incredible that the whole professional

service of the country can thus be carried on. Some of the representative professional orders are very small in number. There were 18,861 musicians, 7,324 actors, and only 6,192 engaged in scientific pursuits, in 1871.

Such, nevertheless, are the facts in relation to the professional classes, and they account in a signal manner for the overwork with which many representatives of these classes are taxed. Let one of them come into notice who has any particular quality of excellence over his fellows, and, too often, the pressure upon him at once becomes too severe for natural human endurance.

### *Class II.—Domestic Women and Men.*

In the second class of our English community we have included persons who are employed altogether in domestic or household labour. The representatives of this important class number 5,905,171. They consist very largely, as may be at once supposed, of women; indeed, out of the whole number only 244,728 are males; so that the women make up over 5½ millions of the whole.

The wives and others engaged in household duties, and the wives who are assisting their husbands in business, make up the bulk of this class; but to these must be added persons of both sexes who are occupied as lodging-house and hotel keepers, including all dealers in "drinks," and domestic servants. The domestic servants make up 1,494,411; of these 1,336,534 are females.

The members of this domestic class are as a rule fairly provided for, and their services, which are much simpler than those of the professional class, are more evenly divided. But some of the members of the class are subject to much deterioration of health and

shortening of life, owing to temptations to depart from the ways of health being cast before them. This fact holds specially true in respect to those who are engaged in the sale of "strong drinks," that is to say intoxicating fluids. These fall fatally stricken at the rate of two to one when they are compared with some other members of the community who live by less dangerous pursuits. No more solemn fact could be recorded in relation to occupation and life.

*Class III.—Commercial Men and Women.*

In such a great commercial country as England it would be supposed at first thought that a third, or a fourth at least, of the people would be employed in commercial occupations. The fact is not so. There are really only a few more people employed in commercial life than in professional. The commercial men and women number 815,424, of whom 758,187 are men and 57,237 are women. The persons engaged in this class are merchants, buyers, sellers, keepers or lenders of money, houses, and goods; dealers, carriers; persons occupied in storage, messengers, and porters. The larger number by far, it will be observed, are males, and as many of these are employed in dangerous pursuits, they are, as a class, exposed to many influences which are detrimental to health and life. It is worthy of note, however, that in some examples of this class the actual risks to which they are exposed are of their own making. The fact is singularly illustrated in the case of the drapers. The drapers have fairly comfortable homes, they are as a rule well off, and their business looks what is called snug and warm. But it is really a business more fatal than that of the porter, shipwright, or watch-maker, be-

cause it is a business carried on in a too close, hot, and dusty atmosphere, in which the worker becomes readily the victim of consumption of the lungs.

This is another important fact to be fixed in the mind, as it proceeds in its studies respecting work and life.

*Class IV.—Agricultural Men and Women.*

The old proverb asks :—

“ When Adam delved and Eve span  
Who was then the gentleman ? ”

In these days we know pretty well who delve and who spin. The delvers of England are now grouped under a distinct class, of which there are two orders; one order consisting of persons possessing or working the land and engaged in growing grain, grasses, fruits, animals, and other products—agriculturists, arboriculturists, and horticulturists; the other, of persons who are occupied about animals, tending and caring for them. The number of persons so employed is 1,657,138, of whom 1,470,442 are males and 186,696 are females.

Of this class of the community it may be said that their work as work is in every respect most conducive to life and health. They are, even in poverty, amongst the happiest of men in respect to their calling. The whole varying phenomena of natural life and beauty are ever before them. The seasons as they roll

“ Are but the varied God ; ”

and all the vicissitudes of season are modified and made enjoyable by the change of life and work that accompanies them. There is the beautiful spring-time with its new work; the summer with hay-fields and ripening corn; the autumn with harvest and

storing for winter ; and winter with beauty even then, and change of labour. Presuming that the agricultural occupation were better remunerated, it were of all the most healthy, and so it has ever been esteemed. And this, which promises so well from a theoretical point of view, is practically what is insured. The health of the agricultural class, despite all the drawbacks to it, is, as we shall see in another chapter, above the average in value.

*Class V.—Industrial Men and Women.*

We come next to the largest of all the classes of workers in this kingdom,—the class called the Industrial. It is not implied by the specific name that this class alone is industrious, but that it is specifically industrial, or of all classes the most closely engaged in handicraft and automatic labour. There are in it no fewer than five orders of workers. One is engaged in mechanical and artistic productions, in which materials of various kinds are used in combination ; a second is employed in producing textile fabrics and articles of clothing ; a third is working to prepare for use various foods and drinks ; a fourth is dealing in animal substances ; a fifth in vegetables ; and a sixth is obtaining and preparing for use the mineral wealth of the country. It will occur to every reader that this class must indeed be large. It numbers 5,137,725, of whom 3,615,727 are males and 1,521,998 are females. Nearly a fourth of the whole population is thus employed in industrial work, and if from the whole population we extract the members of it who do no manner of work that is directly remunerative, the said number of the industrials is raised to nearly a third of those who work for their bread.

Every variety of occupation of a productive kind

comes before us as we look over the labours of this the industrial class. There are the printers and book-binders, the makers of musical instruments, carvers and gilders, toy-makers, tackle-makers, designers, modelists, watch and clock makers, philosophical instrument makers, surgical instrument makers, arms manufacturers, machine and tool makers, carriage-builders, harness makers, ship builders, builders of houses, furniture-makers, and manufacturers of chemical compounds. Following on these are the workers in wool and worsted, silk, cotton, flax, hemp, and other fibrous stuffs, and mixtures of these, together with those who make dresses for both sexes. Workers and dealers in animal foods—butchers, poulterers, fishmongers; makers and dealers in vegetable substances—millers, bakers, fruiterers; makers and dealers of harmless drinks and in dangerous or intoxicating drinks,—these also all come under the class now being described, as well as those who deal in grease, bitters, horn, wings, whalebone, skin, feathers, quills, hair; or in gums, resins, wood, bark, cane, rush, straw, and paper. Lastly, under the same general head are the persons employed in the mines and who work or deal in coal, stone, clay, earthenware, glass, water, gold, silver, precious stones, copper, tin, quicksilver, zinc, lead, antimony, brass and other mixed metals, iron, and steel.

The workers in this great class are in many instances far better remunerated than are the workers in the agricultural class, and in some instances are more freely waged than many of the professional class. At the same time the contention between labour and health which is presented in their case is often most extreme. They have before them a monotony of life *which is most wearying*. They have in many instances *to be subject to physical dangers of no ordinary*

character, and they are exposed to impurities of air. They languish in close and badly ventilated rooms, and often they have to bear excess of toil. They yield, therefore, a large and very unnecessary calendar of sickness and mortality.

*Class VI.—Indefinite and Non-productive Persons.*

There remains, after all the above classes have been considered, a very large class of persons who do no definable productive work. The class is made up—(a) of what are called general labourers and other persons of indefinite occupations, men and women who perform odd services in the community. (b) Of persons of rank and property, who are not returned under any office or occupation. (c) Of scholars and children not engaged in any directly profitable productive occupation. The whole class includes 8,512,706, of whom 4,483,732 are males and 4,028,974 are females.

The analysis of this great class of the community is extremely interesting. The first order of these, those who labour indefinitely, is very small, 802,303; and as the class includes not only those who do odd work and any work, but all less honourably employed, such as vagrants, gipsies, criminals, and women of disreputable life, it represents after all a smaller residuum than perhaps might be expected in such an immense community as the whole English public.

The most startling fact, however, is presented when we come to consider the next division of this class,—the division or order called “Persons of Rank or Property.” It would be thought that in rich England this is a large, a very large class of people. We turn to the official record and behold the whole number of them is 168,195, of whom 143,385 are

females ; leaving a balance of 25,510 men, who may be truly called

The gentlemen of England  
Who sit at home at ease,

And many of whom, after all, are in their homes very busy men indeed. I think that few illustrations could be found that prove better the truly active and industrious condition of this country.

The final division of this class of the great community is the largest of all. It is made up of the boys and girls of the community, of the scholars and children not engaged in any directly productive occupation. These make up 7,541,508, of whom 3,704,301 are males and 3,837,207 are females. The females it will be seen are at this stage in greater number than the males, as they are numerically throughout the whole mass of the population.

Of this class in its entirety less can be said than of the others in relation to health and occupation. The representatives of this class are subject to many influences telling upon their lives ; and at one time the most numerous of it,—the youngest and the most helpless, were more than any other subjected to danger from labour. A wiser system of legislation now throws its protection over the young, and although they are not free from risk altogether, they are now much less impaired by forced work than at the period when the board school and the half-time system were unknown.

### CHAPTER III.

#### HEALTH OF DIFFERENT CLASSES OF THE OCCUPIED.

THE relative value of the health of the different classes has been recently very carefully worked out by the Registrar-General, and we can follow the influence of work on vitality and mortality, with at least some approximation to the truth. In forming an opinion we have, at the same time, to remember the rule of disconnecting the effects of causes of danger which are purely incidental to the labour, from those causes which are directly associated and by absolute necessity connected with it. I will try in the present chapter to describe the relative position of the different classes in respect to health, the one with the other, following the hard facts as they are presented to us, without any reference to the particular influences which lead to particular results.

The health of the members of the first, or professional class, as it is indicated by the value of its life, varied to a degree that could hardly be expected in its different members. The barristers and the Established clergy and dissenting ministers are the healthiest, and are the freest of all from the diseases which kill in early periods of life. After them come the civil engineers, who present a very favourable return. These three representatives of the professional body are indeed at the top of the scale of vitality. Their work, arduous as it may be, is not work that kills. Of the barristers 63 only die to 100 of other professions and trades or industries; of the clergy 71 to the 100, and of the civil engineers 86.

When we turn, however, to certain other of the professional classes, we find a much less favourable

condition of affairs. Solicitors and schoolmasters have a rate of mortality two above the mean; Roman Catholic priests three above; physicians and surgeons six above; chemists and druggists, who are now ranked amongst the professions in the statistical records, ten above; and veterinary surgeons thirteen above. The figures give the range of mortality amongst the professional classes from the extreme highest to the extreme lowest. Taking 100 as the standard, the range is from 63 lowest to 113 highest. On the whole, however, the mortality of this class balances favourably when it is compared with that of the whole class of active workers. The fact indicates that the work of the professional class, taking it altogether, is not unfavourable to health, and is, in many cases, exceedingly favourable.

The health of the domestic class is not so well defined as is that of some of the other classes, inasmuch as the mortality of the women, who make up a great number of the class, has not been relatively determined. The division of the class known as the domestic servant part, has been studied in respect to mortality, and the return is more favourable than might, at first sight, be expected. The domestic servants present a mortality of 98 compared with the standard of 100 for all the other occupations.

The health of another part of the domestic class, as gathered from the mortality returns, exhibits an extreme departure from the standard which indicates the average value of life. In the order of the class which is made up of persons who provide the public with what are called strong or alcoholic drinks the fatality is, with one exception, of the highest degree. The inn and hotel keepers, publicans and licensed victuallers, die at the rate of 138 to 100 of the other classes whose occupations have been fairly and

definitely understood. That is to say, nearly two of this class die to one of the ministers of the Established Church.

The representatives of the agricultural class exhibit, on the whole, a healthy condition in connection with their laborious pursuits. The experience of all times has been in favour of this view, and no observation is more commonly made than that the workers in the fields are amongst the healthiest of the human race. The statement is not so true as to admit of no qualification, but it is generally correct. Of farmers and graziers 85 die to 100 of the rest of the occupied classes, and if with those occupied in agriculture we include the gamekeepers, we have another section affording a still better picture, for the average mortality of gamekeepers is 80 instead of 100. The farm-labourer also, like the farmer, is well represented on the favourable side of the scale. In spite of all the privations to which he has been subjected, his relative mortality is as 91 to the general 100.

Some of the commercial community present a favourable condition of health, others of the class a very unfavourable. Grocers are singularly well placed, the mortality shown by them being actually only 76 in relation to the standard 100. Unfortunately this favourable rate seems doomed to a check. Since the issue of the spirit and wine license to grocers their mortality has increased. Booksellers and publishers have a mortality of 87, and hawkers of 89. Bakers are neither below nor above the average mortality, while the draper is 6 above it, viz. 108, the tailor 9, the commercial traveller 10, the musician and commercial clerk 11, the butcher 11, the hair-dresser 27, the bargeman 29, and the carman, carrier, and drayman 31.

The range of mortality is in this class very wide,

rising from the comparative low figure of 76 compared with the standard, to the very high figure of 131.

Amongst the most striking differences that may be noted in the facts rendered are those which relate to grocers and drapers. The difference is not less than is implied by the figures 76 and 108. It seems most remarkable that such a difference could exist between two kinds of commercial men who live as a rule under similar social conditions. Yet the cause of the difference is extremely clear. It is found simply in the mode of work. The work of the grocer is carried on actively in an open shop into which air is freely admitted; while the draper is shut up in a close shop, the atmosphere of which is charged with fluff and dust, and into which pure air is rarely admitted in abundance. In this way the draper contracts disease of the lungs, which proves very fatal.

The industrial class presents almost throughout all its ranks an unfavourable condition in respect to the value of life. Out of forty-two of the chief industrial occupations, thirty are above the average mortality, twelve only below it. The twelve favoured are the wheelwright, carpenter and joiner, sawyer, brass manufacturer or brazier, papermaker, musical instrument maker, gunsmith, blacksmith, shoemaker, iron and steel manufacturer, tanner and currier, and baker. The twenty-six showing an excess of mortality are in order as they come:—

Engine and machine maker.

Wool and worsted manufacturer.

Iron, copper, tin, and lead manufacturer.

Confectioner.

Miller.

Watchmaker.  
Tobacco manufacturer.  
Shipbuilder.  
Coachmaker.  
Ropemaker.  
Tailor.  
Wool, cotton, and flax manufacturer.  
Butcher.  
Carver and gilder.  
Miner and others connected with mines.  
Cotton and flax manufacturer.  
Printer.  
Bookbinder.  
Glass manufacturer.  
Fishmonger.  
Plumber and painter.  
Railway engine-driver, &c.  
Tool, file, and sawmaker.  
Hatter.  
Coppersmith.  
Needlemaker.  
Manufacturing chemist and dye and colour manufacturer.  
Hairdresser.  
Bargeman.  
Earthenware manufacturer (potter).

In considering this long list of occupations which present a mortality above the average, we have brought before us the facts of a multitude of injuries, many of which are entirely preventable. The greater portion of these injuries are inflicted through the breathing organs or lungs, and chiefly through the inhalation of fine particles of solid materials which are drawn into the lungs, and which produce, first, irritation, and afterwards some form of organic disease, such as

bronchitis or consumption. The flaxdresser, the hairdresser, the earthenware manufacturer or potter, are specially the victims of these injurious occupations, the potter standing with the publican as the highest of all the working community in the rate of mortality, with one single exception, the cabman, who is just a little less favoured. Potters die at the rate of 138 to 100 of the community represented by the seventy trades. The cabmen, who are the most unfortunate of all, stand at 143. The cabmen, however, are a small order compared with the rest, so that, taking the facts as a whole, publicans and potters present the worst lives in respect to health.

Of the health of the members of the sixth, or indefinite class of the population, less is known of a certainty than is known of the other classes. As a general rule, that order of the class which lives from hand to mouth by doing odd work or by begging is short-lived, while that of persons of rank or property is long-lived. The children, who form the great proportion of the class, can scarcely be connected with occupation in such a way as to indicate the existence of a large mortality amongst them arising from occupation. At the same time they may be subjected to over-work, and in former times they were so subjected to a degree hardly credible in these better days.

In addition to the special or particular injuries directly connected with occupation itself, there are some injuries of a general kind, which it were perhaps most correct to consider as indirectly related to the act of labour. To these injuries indirectly connected with labour I propose to devote two or three chapters in the part which will next follow.

## PART II.

### INJURIES TO HEALTH INDIRECTLY CONNECTED WITH OCCUPATION, PHYSICAL AND MENTAL.



#### CHAPTER IV.

##### INDIRECT INJURIES.—POSTURE, BAD AIR, AND DAMP.

**W**HEN a man who is busily occupied is absorbed in his work, he is very apt to subject himself to causes of disease without being aware of the action or even of the existence of such causes. He is ill, or at times feels ill, and wonders why. He attributes what he suffers to the work itself, or to something extra he has done in the way of work, and not to other influences which really lie quite apart from work. Hence it is always necessary to consider the effects of causes which lie outside the work altogether, and which may have no connection with it. Let me give one or two illustrations of this fact in respect to mental workers:—

Injuries occur to men of letters and to ordinary penmen from the mode in which they sit at the desk or table. The practice of sitting at a low desk and in a bending position, so that the front part of the body rests against the edge of the desk, is very injurious. The pressure that is made in this manner on the liver and stomach interferes, when it is long sustained, with the functions of those organs, impairs their function and gives rise to dyspepsia. In writing, as in speaking, the body should be held erect, and no part of the body except the hands and fore-

arms should touch the writing-table. Then, not only is all pressure taken off the digestive organs, but the breathing is carried out more freely and fully.

A gentleman who was closely engaged in writing once consulted me for a symptom of painfulness and uneasiness that invariably followed his occupation. I asked him to indicate the precise seat of the pain; he directed my attention to the place. "See," I said, "at the same place your waistcoat, which is comparatively new, is much worn." "Yes," he replied, "that always occurs even in a few days; it is from leaning against the table." "And your pain," I added, "is precisely from the same cause; it will not occur if you sit erect while you are engaged in writing." He took my advice and has often told me since, that the tailor not less than the doctor suffered from it. The new position was the direct cure.

Some persons in the act of writing sit on one side more than the other, and so produce pressure on the external and upper part of the thigh. The irregular pressure produces numbness running down the limb, from the interference it exerts on the sciatic nerve. The symptom of numbness excites the idea of paralysis of the limb and causes much alarm. I have been consulted several times on this symptom, and have all but invariably seen recovery follow immediately upon the patient learning to sit erect, with the body equally balanced, and the weight of the body equally borne. Once, however, when the pressure had been long continued on the right sciatic nerve, the numbness remained many days, and all work had to be stopped. After removal of the pressure, and after systematic exercise of the affected limb, the sensibility returned and the recovery was completed.

Pressure upon the lower part of the forearm on *the desk*, produced by the act of writing, may in like


manner produce a disturbance in the nervous supply to the hand, and may produce a temporary paralysis of the hand, to which the name of writers' palsy has been applied. In those who sit much at the desk the sight is often injured by the practice of bending too closely over the book or manuscript. By this means the vision becomes short-sighted.

But that which affects all classes of indoor workers most seriously is confinement in an unwholesome atmosphere, an atmosphere in which the air is charged with the vapours which are driven from off the fire or the gas, and in which the exhalations of many persons living and breathing together mix with the other fumes of impure gaseous matter.

It is difficult for a mind untrained to observe the effect of these exposures to danger, to realize all the evil that is inflicted. We have to look at a series of facts, which we arrange before us as if in experiment, ere we can rightly conceive the extent of the harm that actually takes place. Those who suffer rarely complain, and if they do complain, it is not of the cause of their suffering, since that is to them a sealed book. Those who casually observe do not complain, for they do not see all that should be seen. We require, therefore, I repeat, to have marshalled before us some great experimental facts, that we may correctly learn the whole truth.

Such an experimental truth was brought into light some years ago in the famous "Report on the Health of the English Soldiers quartered in England," a report which has practically reformed the health of the army. There are some facts in that Report which deserve never to be forgotten. I will state one, and the inference which it occasioned:—

The Report gives a few tables which indicate the rate of mortality of the soldier at the time the Report



appeared, 1858, with the life of the civil population at the same time:—

*Rates of Mortality per 1,000 per annum.*

In effective men of all ages of the army at home:—

|                             |     |     |     |      |
|-----------------------------|-----|-----|-----|------|
| Total                       | ... | ... | ... | 17·5 |
| Household cavalry           | ... | ... | ... | 11·0 |
| Dragoon guards and dragoons | ... | ... | ... | 13·3 |
| Foot guards                 | ... | ... | ... | 20·4 |
| Infantry of the line        | ... | ... | ... | 18·7 |

In population of England and Wales of the same ages as the army:—

*Rates of mortality per 1,000 per annum.*

|                             |     |     |
|-----------------------------|-----|-----|
| Town and country population | ... | 9·2 |
| Country alone               | ... | 7·7 |

In population of one of the unhealthiest towns, at the same ages as the army—

*Rate of mortality per 1,000 per annum.*

|            |     |     |     |      |
|------------|-----|-----|-----|------|
| Manchester | ... | ... | ... | 12·4 |
|------------|-----|-----|-----|------|

In another table the facts are expressed in a different way, but to the same general effect.

Rate of mortality per 1,000 of men of the army at home, and of the English civil male population at corresponding periods of five years of age, as stated by the Registrar-General—

|                |           |     |      |
|----------------|-----------|-----|------|
| Ages 20 to 25— | Civilians | ... | 8·4  |
|                | Soldiers  | ... | 17·0 |
| Ages 25 to 30— | Civilians | ... | 9·2  |
|                | Soldiers  | ... | 18·3 |
| Ages 30 to 35— | Civilians | ... | 10·2 |
|                | Soldiers  | ... | 18·4 |
| Ages 35 to 40— | Civilians | ... | 11·6 |
|                | Soldiers  | ... | 19·3 |

From these data the reporters came to the conclusion that if the army at home were as healthy as the population from which it was drawn, soldiers would die at one half the rate at which they then died. Nor did this represent all that could be said, for as the soldier's life was a picked life, as all men wishing to enlist were rejected if they bore the signs of physical weakness or tendency to disease, and as all, even after acceptance, could be discharged, on the representation of the regimental surgeon, at any period within three years after admission, all these rejected lives were thrown back on the general population.

Here, indeed, was a series of striking comparisons; but the Report was not satisfactory from them alone, because it did not sufficiently lead up to the possible causes of the contrasts. The reporters therefore went a little further; they compared the soldier at home with the agricultural labourer at home, from data placed before them by Mr. Neison.

In exposition of this part of their work the reporters observed:—"A great part of a soldier's duty is performed in the open air; he receives, as compared with the agricultural classes, an ample supply of food, is well clothed, and is housed at considerable expense. In all these respects, looking at his material position alone, his condition at first sight appears to resemble that of the agricultural labourer, though the latter has disadvantages from which the soldier is secured. If the agricultural labourer, not being a member of a friendly society, falls sick, he forfeits his wages, which are his only means of subsistence. His medical treatment is not lavish, nor the attendance in all cases immediate. If he be a member of a friendly society, he has better attendance, and his sick pay puts him beyond the reach of privation.

"To the soldier the Government stands in the place

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of the friendly society. If he be ill, however slight the malady, he at once goes to hospital, and has all the treatment and all the nourishment that his case may require. Materially speaking, therefore, the life of the soldier at home (and in the following comparisons they are speaking only of the troops in the United Kingdom), and that of the agricultural labourer who is a member of a friendly society, would seem to be open to a fair comparison."

"The tables contained in the able paper by Mr. Neison show, however, that within corresponding ages the mortality of the

|                          |     |     |
|--------------------------|-----|-----|
| Household cavalry is ... | ... | 1.8 |
| Dragoons, &c. ...        | ... | 2.2 |
| Line ...                 | ... | 2.9 |
| Guards...                | ... | 3.3 |

times as great as the mortality of agricultural labourers being members of friendly societies; which is only 6.056 deaths per annum in 1,000, as against 11.1 per 1,000 in the household cavalry, 13.5 in the dragoons, 17.9 in the infantry of the line, and 20.4 in the foot guards."

Finally, the results of comparisons between the rates of mortality of soldiers and the different classes and occupations, were placed in juxtaposition in the following table:—

"Deaths per 1,000 per annum at ages between 20 and 40:—

Agricultural labourers, members of friendly societies, 6.055.

Labourers, rural districts, whether members of friendly societies or not, 8.002.

Outdoor trades in towns requiring great or little exercise, not friendly society, 8.538.

Trades in towns only partially outdoor, not friendly society, 8.449.

Printers, not friendly society, 9·090.

Police, not friendly society, 8·992.

Miners, not friendly society, 10·314.

Household cavalry, 11·1.

Dragoon guards and dragoons, 13·5.

Infantry of the line, 17·8.

Foot guards, 20·4."

The reporters having marshalled forth these remarkable facts, passed, next, to inquire into the causes of them. They first asked what were the diseases which killed the soldiers in such large proportion. In elucidation they supplied a table, from which it appeared that while in civil life at the soldiers' ages, the deaths by pulmonary or chest diseases were 6·3 per 1,000, they amounted in the cavalry to 7·3, in the infantry of the line to 10·2, in the Guards to 13·8 per 1,000; and that of the entire number of deaths from all causes in the army, diseases of the lungs constituted the following proportion; namely, in the cavalry, 53·9 per cent.; in the infantry of the line, 57·277 per cent.; in the Guards, 67·683 per cent.

They continued: "It may be stated that in civil life insufficient clothing, insufficient and unwholesome food, sedentary and unwholesome occupations, and the vitiated atmosphere of unhealthy dwellings, all contribute to the propagation of this class of diseases. But in the army it cannot be alleged that the clothing, the food, or the nature of the occupation in itself, are of a character which would justify the imputation that they are among the predisposing causes of the excessive mortality of the soldier by pulmonary disease." To trace out the cause of this excess of lung disease in the army at home, the reporters next proceeded to the process of the investigation of cause by exclusion. Thus they were able to exclude as efficient causes, (a) night duty, (b) want of exercise and suitable employ-

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ment, (c) intemperate and debauched habits; while they were led to discover a perfectly efficient cause in (d) over-crowding, insufficient ventilation and nuisances arising from latrines and defective sewerage in barracks. One cause alone, viz. vitiated air, acted with such intensity, especially when superadded to a certain amount of exposure, as not only to produce in the Foot Guards an amount of the disease in question, greater than was produced in civil life by all the four causes united, but which actually carried off annually a number of men in the infantry nearly equalling, and in the Guards actually exceeding, the number of civilians of the same age who died of all diseases put together.

Even here again, it must, moreover, be remembered that the returns of death occasioned by pulmonary affections in the army did not present the whole amount of mortality caused by this class of diseases, a large number of men being constantly invalided and discharged from the army when incapacitated for duty by the progress of the malady.

In further support of this view they compared also the mortality of the army when it was huddled before Sebastopol in 1856 with that of the troops at home, and discovered that the mortality before Sebastopol was nearly one-third less than the mortality of the infantry of the line, and two-fifths less than that of the Foot Guards when barracked in England. The numbers were as follows:—"The mortality of the army before Sebastopol, during 22 weeks ending May 31, 1856, was, including deaths by violence or accident, at the rate of but 12·5 per 1,000 per annum, as against 17·9 in the infantry and 20·4 in the Guards when quartered in England."

I have brought in quick review these great and now almost forgotten facts, because of the lesson they

teach and at the same time prove. The lesson bears directly on our present study.

There are a number of occupations still in existence in which the story of death in the ranks, as it was told in the once afflicted soldier, picked man as he was, is still told. In these instances the cause of death is the same,—namely, disease of the pulmonary or breathing organs; and the cause of the disease is the same,—close and vitiated air, air vitiated in the workshop, the factory, and the sale-room or retail shop. Those who suffer most severely in this manner in these days amongst the followers of well-defined occupations are, in order of severity,—

The bookbinder,  
The printer,  
The carver and gilder,  
The office clerk,  
The chemist and druggist,  
The tailor,  
The needlewoman,  
The draper,  
The coachmaker,  
The watchmaker,  
The solicitor or attorney,  
The schoolmaster,  
The confectioner.

The reporters on the health of the army in 1856 were able only to compare the health of the soldiers with that of the class of the general community returned as clerks. They might up to this very time maintain the comparison, in so far as clerks are concerned, for they, as the list above shows, still hold a comparatively high place amongst those who suffer from vitiated air.

An analysis of the cause of death through disease in the above-named classes yields results similar to

those yielded by the army report. Again the fatal diseases are the diseases of the lungs; again the cause specially at work when the other causes are removed, is bad or vitiated air.

The late Dr. Robert Dundas Thomson pointed out this fact in relation to one particular occupation, as it is carried out in the open country district and in the large town. He particularized the blacksmith, who is not included in our list given above, because, on the whole, his occupation is a healthy one. But Dr. Thomson showed the country blacksmith by the side of the blacksmith working in the close shops in Marylebone, and he pointed out, that while the mortality of blacksmiths in Marylebone in 1856 was as high as 31 per 1,000, the mortality of the same class was as 19 per 1,000 for all England, the total mortality for males of all classes above twenty being 20 per 1,000. In more modern calculations we come upon more startling comparisons. If the reader will refer to the list just rendered, he will see the draper eighth down on the list. The draper dies at the rate of 108 to 100 of the standard of seventy occupations. This is not much above the average; but let it be compared with some businesses that are below the average, and then the contrast is most distinct. Place again the draper by the side of the grocer for example, and it comes out that the grocer dies at the rate of 76 to 108 of the draper. Or place him, the draper, by the side of the bookseller, and he is seen to die at the rate of 108 to 87 of the bookselling community.

The cause of difference is not far to seek. It lies in the closeness of the occupation of the draper, in the vitiated, bad atmosphere he is accustomed to breathe.

It is sad to realize the fact I am about to tell, but

it must be told. It is that the names of the occupations I have specified become all but correct indices of mortalities at this present time. For instance, taking 100 as the mean rate of death or standard of seventy occupations, the workers named in the list, on page 33, die in the following proportion :—

The bookbinders, 116.  
The printers, 115.  
The carvers and gilders, 112.  
The office clerks, 111.  
The chemists and druggists, 110.  
The tailors, 109.  
The drapers, 108.  
The coachmakers, 107.  
The watchmakers, 104.  
The solicitors, 102.  
The schoolmasters, 102.  
The confectioners, 101.

Here is a scale produced out of the occupations themselves. Compare the *bookbinder* and his mortality of 116 with the *bookseller*, who has a relative mortality of 87; or compare the coachmaker, and his mortality of 107, with the wheelwright, who has a relative mortality of 88, and the lesson is severe in the sharpness of its teaching and the definition of its meaning, especially when it is read by the light of the facts relating to the soldiers at home in 1856, and to the other classes with whom they were compared.

There is another external factor which is productive of extra mortality beyond the work of the occupied, and which requires also to be noticed in this part of our studies. I refer to damp, or exposure to dampness and moisture. We see the influence of this factor markedly illustrated in a few well-defined occupations, as, for example,—

The bargeman,  
The dock labourer,  
The fishmonger,  
The butcher.

The first of these, the bargeman, presents a mortality of 129 to 100 of men of seventy other occupations. He is constantly exposed to wet and cold, and he often sleeps in a small and close cabin. He suffers severely from rheumatism, bronchitis, and heart-disease, and he dies from those diseases more than from any other.

The dock labourer is in like manner constantly exposed to close damp air and wet. He suffers from the same class of diseases, and dies at the rate of 121 to 100 when compared with the general standard. Compared with another standard, that of the agricultural labourer, he dies at the rate of 121 to 91, and compared with the sawyer, at the rate of 121 to 95.

Fishmongers are exposed to the same danger. They are, it may be said, always in the wet. The fish they handle are wet and cold. They have constantly to take oysters out of water; they are frequently using ice, and their shops are almost at all times moist and cold. Their shops are not less freely ventilated than those of the grocer, but the grocer is dealing in dry food, the fishmonger in wet, and in this simple difference lies the difference of life-value of the two classes. It is a marked difference indeed; it is that of 119 fishmongers to 76 grocers.

The butchers afford yet another example of the same order of fact. The butchers die at the rate of 111 to 100, the standard of the other defined trades or callings. The butchers are much exposed in the slaughterhouse to cold and wet, and their places of business where they sell, though less damp than the shops of the fishmongers, are comparatively damp. The butchers, too, are subjected to an occupation

which is distressing to the mind, and in large towns, where they are rarely provided with well-ventilated workplaces, their mortality rises beyond what has been stated.

The butcher and the fishmonger suffer from rheumatism, bronchitis, and heart disease as common complaints, and the excess of their mortality is traceable to those affections.

Thus unnatural positions of body, bad air, and exposure to moisture, are all causes of disease and of great mortality amongst the occupied. But they are really all extraneous causes, connected indirectly only with occupation, and nothing more.



## CHAPTER V.

### SEASON AND OCCUPATION.

MEN of every occupation are very much influenced by season. We all feel the influence, and in our daily lives various forms of speech are in use expressing the fact. The weather is dull, the weather is damp, the weather is depressing,—these are terms we often hear, and they no doubt describe what we feel very correctly. But the terms, after all, do not convey the whole truth as it ought to be known. It is the fact that in the different seasons of the year we are being subjected to great changes of body, which materially affect our health and life, and which are induced to a large extent independently of our will or of our actions. We are gaining and are losing weight of body at particular times of the year with a regularity which is as singularly correct as it is singularly interesting.

This fact was first brought out, and I may really say discovered, by my late friend Mr. W. R. Milner, for many years medical superintendent of the large prison at Wakefield. He came upon the truth by the laborious task of weighing the prisoners who were under his care at regular intervals. As the results have a direct bearing on the effects of season on labour, especially on physical labour, I record them here at some length.

The prisoners were all males, between the ages of 16 to 50, and were all presumed to be in good health when sent. The cells in which they were confined had a cubic capacity of about 900 feet, and from 30 to 35 cubic feet of air per minute were passed through each cell.

The mean temperature of the cells for the entire year was 61°; the highest monthly mean, 66·5°, occurred in August; the lowest, 56·9°, in March.

The diet was uniform, with the exception of the alterations ordered by the medical officer in individual cases, and consisted of the following articles daily:—Bread, 20 ounces; meat, without bone, 4 ounces; soup, half a pint (these are equivalent to about 7½ ounces of butcher's meat); potatoes, 1 pound; skimmed milk, three-quarters of a pint; gruel, 1 pint, containing two ounces of oatmeal. The dress was cloth jacket, waistcoat, trousers, cap, and stock, linen shirt, woollen stockings, drawers, and under-shirt.

The prisoners were sent out to exercise in the open air nine hours a week; the exercise was for one hour at a time; the men walked in circles, and every ten minutes they ran for 150 yards. They were all supplied with work, and were for the greater part employed in making mats and matting of cocoa fibre and other materials; some worked at tailoring and shoe-making, and a few had other work to do,

All the prisoners were weighed on admission, and at the latter end of every calendar month during their stay.

The number of prisoners over whom his observations extended were 4,000; the period of time occupied, 10 years; the average number weighed monthly, 372; and the total number of individual weighings, 44,004.

The men were all weighed by himself, or under his superintendence, and the series of observations was unbroken.

The results of these weighings were tabulated on various bases, with a view to isolate the effect of a certain number of variable conditions, on the gain or loss of weight among these prisoners, and to determine the amount of influence exerted by each of these conditions.

The conditions which he selected for investigation were,—

1. The season of the year.
2. The period of imprisonment.
3. The employment in prison.
4. The age of prisoners on admission.
5. The weight of prisoners on admission.

The influence exerted by each of these conditions was well marked, and, with one exception, viz., the influence of season, the deductions were such as would have been anticipated.

The first results show the influence of the season of the year on the weight of a number of men placed during the entire year under circumstances of food, clothing, and work which did not differ, and who, for the greater part of the day were in a temperature which did not vary greatly between the hottest and the coldest months. Under such circumstances, it might be expected that the weight of the men, taken

as a whole, would remain sensibly the same, and that the numbers losing or gaining, as well as the quantities lost or gained, would vary little month by month; or, that, if any marked variation occurred, it would be of an accidental character, depending on the greater or less amount of sickness during any particular month. The inspection, however, showed that a marked periodicity existed; and that, taking an average of years, there were two distinct series of months, during the one of which there was a constant loss of weight, and during the other a constant gain; so that, if the year were divided into quarters, there was a loss during the first and fourth quarters, and a gain during the second and third.

The two series of gaining and losing months were unbroken, except in one instance. In November, which is in the losing series, a gain occurred. The amount gained was very small, and the discrepancy was probably caused by the arrival of large numbers of prisoners in September and October. It will be shown under another head that the men usually gained weight for a short time after they were received, so that probably this break in the series resulted from the influence of the stage of imprisonment, rather more than balancing the influence of season. On looking down the columns which show in each record the average gain or loss per prisoner weighed, it was seen that, beginning at December, the amount lost per man increased rapidly and very steadily, till March, and that between March and April there was a very abrupt transition from loss to gain. The gain then continued till August, the amount gained increasing on the whole, but by a series of jerks, each alternate month presenting a larger and a smaller gain respectively, so that to obtain a steadily increasing series it would be necessary

to couple the summer months in pairs. Between August and September a change of sign occurred about equal in amount, but in the opposite direction to that which took place between March and April.

The changes between March-April and August-September were far greater in amount than the changes which took place between any other pairs of consecutive months; and this remark applied with greater force to the percentages of men gaining or losing, and to the net gains and losses, than the average gains or losses per man.

The inferences which may be fairly drawn from these observations were,—

1. The body becomes heavier during the summer months, and the gain varies in an increasing ratio.
2. The body becomes lighter during the winter months, and the loss varies in an increasing ratio.
3. The changes from gain to loss, and the reverse, are abrupt. The gain begins about the end of March, the loss at the beginning of September.

The results which Mr. Milner thus obtained from the discussion of a large number of periodical weighings, presented a remarkable relation to the results obtained by Dr. Edward Smith from a series of most valuable and elaborate experiments which he made on the quantities of carbonic acid thrown off by the lungs at various seasons of the year. For instance, Dr. Smith found that the quantity of carbonic acid thrown off is much greater in winter than in summer. Mr. Milner showed that the prisoners lost weight in winter, when the evolution of carbonic acid is great, and gained weight in summer, when less carbonic acid is given out.

This in itself would be a striking coincidence, but it will be seen that a sudden change took place

between March and April, and at the same time of the year Dr. Smith found that a similar change took place in the amount of carbonic acid thrown off, and that the *amount* of the change was much greater at that period than at any other time, and so much greater that the great alteration struck him as being a very remarkable circumstance. Dr. Smith's paper was read at the Leeds meeting of the British Association, and his observations did not extend to the August-September period. Mr. Milner was, therefore, unable to say if any equally marked change takes place in autumn. There can be little doubt that variations of temperature, light, &c., are the principal agents in causing these changes, but he believed it would be found that, in addition to the direct influence of these physical agents, a periodic action occurs in the system which adds to or diminishes the effect of the physical agents alone.

From the consideration of the facts thus collected we may fairly infer that there is a periodic variation in the weight of man during the year, the six summer months being gaining, and the six winter months being losing months. The amounts gained or lost gradually increase from the commencement till the termination of each period respectively; the change from the gaining to the losing period, and the converse is, however, abrupt, and these changes take place at times not very distant from the vernal and autumnal equinoxes.

Such are the important facts relating to season and health collected by Mr. Milner. How they bear on the subject we have in hand will occur to the intelligent reader as he proceeds, without any additional note of mine.

## CHAPTER VI.

## PHYSICAL OVERWORK.

IN addition to the other extraneous evils connected with occupation must be added the effects due to overwork. Some have imagined that overwork as a cause of disease is less than many philanthropists have maintained it to be. I shall try in this section of my book to look the facts straight in the face, and to give them as they seem fairly to stand forth.

With the exception of the occupations of the fighting man, the physician and surgeon, the fireman, the driver of the locomotive, the miner, and one or two others in which physical accidents are not uncommon, there is no occupation from which life is actually and professedly endangered; and even amongst these exceptions the risk is comparatively small. Thus, amongst medical men, who as a class are more exposed to danger than any other members of the community, the mortality per cent. is but little above the average of that pertaining to the community at large. We are driven, therefore, to seek for the dangers attributed and apparently traceable to occupation, not in the occupation itself, but in the method by which the occupation is carried out.

Dismissing the mischiefs arising from the external conditions, or the surroundings of daily work, let us look at the development of overwork in its simple and undisguised forms. These forms appear under two heads: the physical and the mental. I shall treat in this chapter of the physical.

Physical overwork carried to the extent of producing disease is found in a few occupations, in which, when they are properly carried out, the highest attain-

ment of bodily health may be secured. The blacksmith affords us a good example of this class. There is scarcely a man who follows an occupation that is more conducive to health than a blacksmith : he is an early riser ; his business calls forth active muscular exertion ; he is but little exposed to inclemencies of weather ; and his digestion, as a general rule, is of the soundest. We see him, by virtue of these advantages, living in the country village to an age beyond the ordinary duration of human life ; a marked man,—hale, strong, and hearty. But we follow him into the great city, and he is another man altogether ; he still rises early, but he now works late also. In the course of his life, if he be a moderately strong man, he can strike, from the age of twenty to sixty years, the sum of 36,000,000 of blows on his anvil, or 3,000 in each working day of 10 hours, and not suffer more than the extreme of ordinary wear ; but when two extra hours—600 blows more—are laid on him per day, in the course of a year there is added to the mean work of his life a sum of 60 days, and in five years one whole year. The case of the overworked blacksmith is an admirable example, because it brings the subject into a light so purely physical. And when we connect the over-work to which, in the crowded city, he is subjected, with the impure air which he has to breathe, and the other destructive influences which tell upon his life, we need not wonder that his physical powers are exhausted before the natural time. How far he suffers shortening of life in a great city has already been shown in a preceding page (32).

Some men are kept too long engaged in what many consider light work, but which, by its persistency, tells rapidly on the constitutional power. Postmen are good illustrations of this. The automatic rapidity with which the postman does his work so cleverly

and, as a rule, so admirably, is, I believe, in every case too prolonged each day to be consistent with the health of a class as a whole. To be constantly on foot and in rapid motion, as the postman is, is to be subjected to a strain that must needs be limited in its duration. And this is the practical reality. The labour of the postman stops from necessity much sooner than it need to do, and much sooner than it ought to do for the advantage of the public. A postman who knows his district perfectly is an invaluable public servant, and ought to be kept at his work as long as possible. It would be more expedient, indeed, both in regard to public expense and to convenience, to employ a greater number of the same hands in postal service than to force an excess of labour out of a few.

Some occupations, as they are at present carried out, are at all times too heavy for human strength, and nothing but mere drudges of life can in truth be called upon to carry them out. Coal-heaving, heavy portorage, brick-carrying, and the sustainment of other burdens of a similar nature, all suggest an infliction on human energy which an advanced civilization will surely never permit to continue.

There are certain other muscular occupations which, by the kind of exertion they enforce, are injurious, without reference, altogether, to excess. Rowing, carried out as a systematic labour, is a typical illustration of this kind. In rowing, the lower limbs of the body are fixed steadily, while the trunk plays upon the pelvis with backward and forward movement and great muscular strain. The effect of this is to subject the thoracic and abdominal organs to excessive pressure. The bloodvessels at these parts are brought to their extreme limit of capacity for labour, and the heart has thrown upon it an

amount of work which is disproportionate to its capacity for work for more than a limited period of time.

In some cases physical overwork is carried out by a process of admixture of labours which are not akin. This fact is evidenced in the volunteer movement. For men already engaged in active outdoor pursuits volunteering may be for a time harmless; but for those who are confined within doors, it is no godsend to enter into the exertion at drill and then to make a long march, after the work of the day is over. I recall with much pain as I write many distressing facts that have entered into my experience since the volunteer system first set the nation in a ferment. There is before me the remembrance of a young man whose promise in life was most enviable. A scholar, rich in wit, happy in debate, affectionate in disposition, and of most winning manner. Here on the table lies his legacy to me, a volume of Burke's speeches, on which his own clear intellect was learning to rest, and on which his natural and telling eloquence was to be modelled. He had a good position as an active worker, an agreeable occupation, hosts of friends, and prospects happy and various. But one unlucky day the volunteer mania seized him, and with that enthusiasm which naturally marked him in all he did, he must go into his new pursuit heart and soul. Of a build not immoderately weak, but yet not strong, he entered into physical competition with men inured to fatigue, and of far greater strength. His day's work—itsself sufficiently laborious—over, he must away to drill, and then to the march, and from town long distances, to step into it again, keeping up with the rest of the *corps*. One night, after a heavy day, he accomplished *a march of twelve miles in measured pace, and*

thereupon his march on the course of life was finished. The labouring, perplexed heart could bear no more. Had he met with an accident and blown off a hand or a foot, it would have been lamentable, but it was as nothing to that night's march. He simply went home to struggle through a few months of misery and to die. I could multiply example upon example of this kind, and I could show also that it is not always the men of light and feeble build who suffer. I have seen men who have waxed fat, and who have joined a corps "to work themselves down," succumb, under the exertion, with equal rapidity; and, indeed, I doubt if there has been one single corps of volunteers raised in which the evils named have not been called forth. Whether the volunteer system be a necessity of the time I am not certain; whether, granting the necessity, the exercise of the volunteer need be so severe I cannot say; that is a question for the drill sergeant and commanding officer to answer. It is my business simply and solely to indicate that the service, as it is now carried on, is too severe for the majority of overworked Englishmen, and that, instead of imparting national strength, it is often leading to weakness, by enforcing an excess of physical exertion.

102 We trace the injurious effects of physical overwork in other and almost endless phases in modern society. But in some classes it is terrible to witness; as in the baker, the compositor, the needlewoman, and the representative indeed of every trade, or art, or profession from which some product has to be furnished within a given period of time, and in which indifferent remuneration for work done, or greed on the part of an employer, prevents the due distribution and division of toil. We lose sight of the evils in those classes where custom or rights of labour, or association, or

other kindred influence steps in and persistently demands that, come what will, the human machine shall be worked for so long a time in the twenty-four hours ; and the lesson taught by these observations qualifies, in the mind of the unprejudiced man, any opinions that may be forced upon him relative to those industrials who strike and starve rather than submit to labour carried beyond endurance. For rude, violent, and indifferently motived as the act may be, and short-sighted as it may seem, a strike for short hours is a solemn protest against the violation of natural laws, and a protest from which the man who voluntarily overstrains his life-powers may learn a lesson very useful to him, though it come to him in a form that may be distasteful to his modes of thought and to the principles on which he conducts his career.

If it be asked as a practical and immediate question,—In what manner does overwork of a physical kind kill?—The answer is easy. During life the forces by which the life is manifested are balanced against time, *i.e.*, an active development of power or motion is brought into opposition against an entire negation. The contest is unequal. The active animal machine must rest and recruit; time, an absolute immateriality, flows on unceasingly, destroying as it flows, silently and surely. Men hold the same position to time as solid bodies do to the current of a river: if they bend to the stream, it destroys them slowly; if they stand against it and breast it, and defy it, they are more conspicuous men for a season, but they are the sooner overwhelmed. Again, the powers or forces of the body are limited by the size or capacity of the organism;—by every degree of force that is liberated in the combination of air with blood, or, to go to first *principles*, of air with food. The combustion of a *pound of bread in the furnace of a steam-engine* would

give a certain measure of force, in different order of time, according to the rapidity of combustion. In the body the same pound of bread would virtually produce the same results, viz., so much force in a given time, according to the rapidity of the combustion. But as the body is constructed, its power of receiving food or fuel and its capacity for taking in air are limited; hence the force that it can receive is limited; and hence, if the force it can put forth in a stated period be greater than that which ought to be put forth in that time, the extra force is exhibited at the expense of the organism itself, and by so much as is lost in the effort will so much be lost for the future. For the fully developed body is not constituted to make up against time the slightest breath of force that it has once lost. If it were constituted to make up and recover its vital losses, the renewal of life would be easy, and individual death, which is now in every case the triumph of time, would be avoidable.

The exact mode of death from physical overwork is by the destruction of those parts of the body on which the involuntary acts of life depend: the muscles and structures engaged in the digestion of food, the circulation of the blood, and the respiration. These organs and parts, which, at the best, never actually rest, become, when extra demand is put upon them, seriously influenced, and as they are the most important, so their failure is most serious. When once they, one or all, fail, everything depending on them fails too. Usually in some cases of physical overwork the heart goes first; but sometimes the muscles of respiration go equally early, or even take precedence in the bankruptcy of life. In either case the stomach and other digestive organs follow in the track of failure, and the end is quickly pronounced. Judging

from my experience, I calculate that in three cases out of six the first indications of physical mischief are presented in the heart and circulation; two in the respiratory system, in the form of bronchial disease, of spasmodic breathing, or of consumption; and one in the digestive system. Often, however, by the unlearned, indigestion is put forward as the first ascribable evil, not because it is first, but because, whenever the circulation or the respiration is impaired, the digestion inevitably becomes impaired also.

I have traced, up to this time, the mischief arising from physical overwork as due to undue wear of certain vital parts of the organism,—and in the main this is right. There is yet another evil to be considered before this chapter is brought to a close. I allude to an evil arising from the difference of action of different organs in states of rest and exertion. Within due limits, the body during the first, second, and third stages of life has sufficient elasticity of structure to allow of a marvellous adaptation to varieties of form and of labour; but in brief time, if the variation be immoderately enforced, this facility of adaptation is reduced. If a man be exposed to exertion which leads to prolonged and excessive action of his breathing and circulating organs, those organs become increased in capacity and out of proportion to the construction of the body as a whole. Thus they become unfitted for the body as a whole, and in periods of rest are a burden and a constant source of discomfort. Ultimately discomfort amounts to pain, and the physical modification leads to permanent disease. My late friend Mr. J. F. Clarke has elucidated these points very ably in his report of the condition of Heenan, the prizefighter. In Heenan, *systematized over-training* disturbed and destroyed *that harmony of functional action* which is as

essential to the human body as it is to the universe at large, and which, if trifled with in the universe, as it is in men, would lead to disorganization even there. But the poor prizefighter is only a prominent type of thousands who, in the fight for fame, or position, or sad existence, break down physically before they have reached their prime or achieved their object. The physical evils which arise from excessive muscular exercise are of two kinds, local and general, the latter depending as a rule upon the local in the first instance.

The local peculiarity that occurs partakes generally of the character of an excessive development of the muscle or muscles overworked. The working arm of the blacksmith is frequently adduced as an illustration of the change induced in the manner described. The muscles are proportionately enlarged, so that the limb they move is capable of performing a greater amount of work than the less active limb on the other side of the body, while at the same time it is by education capable of attaining a refinement of skill to which the other is an entire stranger. Local changes of the character named, when they affect administrative organs of the body which are purely volitional and have no relation to vital involuntary functions, are harmless and, it may be, useful.

Unfortunately, in order to sustain prolonged muscular exertion, the service is required of another muscular organ which is central to the whole body, which is involuntary in its work, and which cannot be disordered ever so little without communicating some shade of derangement throughout the whole organism. That muscular structure is the heart. The effect of this is that the heart soon begins to undergo modification of structure under prolonged over-exertion. At first its nutrition is increased,

then it becomes over-active and over-powerful, and in time it holds a relation to the body at large, which is out of proportion in respect of balance of power with all the rest of the body. Presuming that the excessive exercise to which the heart is subjected is carried out early in life, while there is yet elasticity of the other vital organs, the body adapts itself to the increased pressure and motion, and so in the early period of completed life the balance is restored and a time of healthy balance is secured.

It will be asked, Why should not this correct balance continue? The answer is plain. It will not continue, because the elasticity is not persistent. As the body becomes developed and the structures firmer, the resistance to the stroke of the heart increases, and the heart begins, as it were, to bear a load which oppresses it beyond the work which is put upon it. Moreover, its own nutrition now is less active, its own structures impaired. Thus it in turn gives way before the resistance. It becomes relatively feeble, and with its feebleness all the rest of the organism necessarily sympathizes. In one of my studies I calculated up what may be considered the complete numerical value of the effective strokes of the heart of a person who has lived to fourscore years. The numerical value of strong or fully effective beats, or strokes, may be fairly taken at about three billions, which will have been delivered at the rate of rather more than one hundred thousand a day. The heart which accomplished the three billions of effective beats in the eighty years is estimated in this calculation as performing a fairly natural life; and we will suppose that, according to the construction of the organism to which it belonged, it carried out its fully allotted task. It worked eighty years, and made the three billions of effective strokes;

that was its limit of work done in the time named. If it had been the heart of a postman, the rate of its effective work would possibly have been expedited a good fourth during the period of its increased activity. We may deduct from the time when its increased activity commenced a fourth of the value of the life, so that if the work commenced at twenty years of age, a fourth part of the remaining sixty years might fairly be deducted, bringing the duration of the life, that should have been 80 years, to 65 years.

I do not give this as more than an approximate calculation, but it is not far from the truth, and the day will come when such calculations will be made sufficiently correct to supply good valuations for the worth of life in all purely muscular occupations.

In all the workers I have named, and in others similarly situated, the bodily failure which leads to premature death commences in the circulation in the manner suggested. The heart becomes enlarged in the first stage; the vessels become unduly taxed in the second stage; the elasticity declines and the resistance increases in the third stage; the heart becomes readily enfeebled in the fourth stage, degenerated in the fifth, and incompetent for its functions in the sixth. In a seventh and final stage, one of premature old age and decay, some of the other vital organs—lungs, liver, kidney, or brain, follow their leader in failure of function, and death closes the scene.

## CHAPTER VII.

## MENTAL OVERWORK.

WORK that engages the mind differs, in degree and in effect, in its influence on the body even more widely and determinately than pure physical work. For the sake of clearness I may describe six distinct classes of mental workers. First, there is the mere copyist, the man who sits all day at his desk and transfers copies of writing or of a speech to a piece of paper. The clerk, the compositor, the reporter, and the second or third-rate author are of this class. Secondly, there is the thinker and writer, who copies also, but not directly from other writings, nor from thoughts expressed by other minds; but who goes to the great manuscripts of the Supreme Author, to the hills, and plains, and oceans, to the living and dead kingdoms of animals or plants, and transfers the pictures of these to canvas or paper, bringing the parts of the universe, as seen by his superior sense, into moderate compass and legible form, so that lesser minds may read them through him. Thirdly, there is the speculative man, usually very selfish and locked up in himself, who from day to day and night to night and hour to hour schemes; who walks with his head down, his eyes on the earth, and thinks,—thinks how he shall meet this obstacle, waylay that plan, and anticipate such and such events; a truly business man in the world's acceptance, one who is up and down like a Jack-in-the-box—very large when he is up, and out of sight veritably when he is down. Fourthly, there is the man who carries on his shoulders other people's anxieties, who thinks for others rather than for himself, and must never be tired by the effort:

the professional man is here represented, the politician, the physician and surgeon, the lawyer and their likes. Fifthly, there is the artist, who labours towards perfection at some given task, and, absorbed in his work, forgets the world around him, and day after day toils on, supported by the applause of many admirers, and sad without it. Lastly, there is the learner, the student, the child or youth, whose will is hardly his own, who works as he is bidden and plays when he is permitted, who is fed too often with flattery or blows, and between one and the other is at length turned out on the world prepared, as it is thought, by education and training, to fight the great and unceasing battle of life.

In all these classes we meet with characteristic peculiarities. In the first class, those whom I have designated copyists, the diseases which arise are due almost exclusively to sedentary habit, confinement of the body in one position, deficient exercise, and exposure to close air. In the occupation itself there is nothing specially injurious; indeed, there are few occupations more conducive to good health. There is little wear of body, and little loss of power beyond that which can be naturally eliminated from the food that is eaten and the air that is breathed. The man sits before his copy; the light by which he is working strikes the copy and is reflected back, bearing with it the impression. The copyist's eye receives the impression, it is, as it were, photographed on his retina, and is transmitted to his brain; from his brain it is reflected to his hand, his hand puts it down on another surface, and the task is complete. Here, there is little expenditure beyond that which is required to work the muscles of the arm and hand; and the exertion called forth, although tiring, is not exhausting. The copyist, nevertheless, is often an

unhealthy being, living, it may be, beyond the average term of the life of his countrymen, but usually complaining. If he should systematically work more than ten hours daily, these complainings increase, and they naturally are much intensified by confinement in a close unventilated room, by an air of unequal warmth, or by dryness and closeness of the air caused by the heat of an iron stove, or from gas. His complaints, in the main, are referred to the stomach; he is unable to eat many things at once, and the best that he can bear is borne indifferently; for a man who does not breathe sufficiently cannot produce the digestive juices in due quantity, and the man who does not move his muscles sufficiently cannot secure an efficient removal of the waste products of his organism.

To this class, the copyists, the real danger of overwork comes mostly when such work has to be carried on with deficient sleep. When that occurs, the copyist fails like other men; and hence we find the most suffering members of this class amongst the clerks and the compositors,—printers. From early symptoms of dyspepsia, these become feeble and worn; then they are a prey to injurious surrounding agencies, against which they are unable to make head. The digestive system becoming imperfect, symptoms of defective circulation and respiration manifest themselves. A disorder of the blood known among physicians as anæmia, that is to say, a pale, thin condition of that fluid, in which its nutritive property is greatly impaired, sets in; cough supervenes, increasing debility, and often the evidence of the disease known as pulmonary consumption. In my own public practice I have seen no less than 326 cases of diseases of the lungs thus engendered in clerks and compositors alone; and in nearly every case, while there have been

other elements unquestionably at work, such as impure air, confinement, improper food, and very frequently irregular habit of life, I may say, I think safely, that first of all on the list of causes overwork and nightwork deserve place.

Amongst the copyists we may assume that the evils from which they suffer are of the purest physical character. In them a light occupation is transformed into one that wears out the organism by the same process as that by which the drop of water, persistently falling, wears away the stone. And the truth of this is singularly borne out by the circumstance that the copyist never suffers from diseases of the brain as the results purely of his occupation. Let me be understood. He may suffer from brain disease, from inflammation, old age, accident, or hereditary predisposition, as other people do; but this fact stands apart from the work on which he is engaged.

In a modified degree the same facts apply to the reporter. Apart from the nightwork, the hurry, and the confinement, the reporter has no occasion to suffer. Uninfluenced by the passions and feelings of those who speak, he sits, one of the most marvellous instruments of knowledge that can possibly be conceived, with words and debates physically streaming through him. The orator is speaking, and in the act he throws into wave-like motion the atmospheric sea, and into the small orifice of the human ear, a space not wider than half an inch, communicates to the tympanum of each operator motion, simple motion. That motion speeding away to the brain through the auditory nerve, for an infinitesimal space of time nestles there, is translated there, and sent away down the spinal column and the nerves to the muscles of the hand, to be turned by them into written syllable

and word, and to be fixed on paper: a wonderful process, truly, but one, when once mastered, assuming an almost mechanical form. In some cases, it is so mechanical that the operator holds nothing of what he has transcribed in his memory. One of the best scientific reporters I ever knew told me himself, when I had occasion to ask him to give me a reference to a certain debate, that, beyond the moment, he had not the merest recollection of the substance of any debate he ever reported. "I am," he said, "like a sieve; it all goes through me, with this difference only, I fear that I am an indifferent sieve; for good and bad go through alike." Of course there are exceptions to this rule, for one hears sometimes of men who can actually listen to a dull sermon and remember it all; as there are also instances where natural musicians can hear a new melody, rush home, and give it utterance on an instrument. But these examples are extremely rare,—so rare that it is impossible to state whether any mischief arises from the mental effort.

The men of the second class to whom I have referred,—those who think as well as write,—suffer from overwork in a very different and more serious way. With regard to them, however, it may at once be stated that their work need not of necessity be seriously injurious. In moderation, in cases where from three to four hours of mental labour are spent per day, with an occasional holiday of a few weeks in the year, and with due regard to change of thought and action, literature is a comparatively harmless occupation, and when followed for its own sake rather than for what it will bring to the pocket as a means of subsistence, is surely one of the most fascinating and *useful of all occupations*. Still, *thinking* is an effort *which cannot proceed without waste*. Before the

hand can put down that which the thinker would say, great sections of the brain have to be brought into vigorous action. Comparisons must be struck, recollections of the past conjured up,—that past having perhaps never been seen by the writer, but only received by description, derived from hearing or reading. Then, to be effective, a beautiful order must be followed; colouring must, perchance, be given, and taste must be called into requisition. Finally, when each sentence is conceived and perhaps rudely written, the matter must be arranged after some particular method or style, so that the subject when finished shall be harmonious in all its parts and clear in its recital. To secure all these advantages the brain, as I have already said, must labour,—must yield force, in other words, and that force must come from some source, and that source is the blood, and that blood, supplied to the brain in larger quantity than any other organ, must be derived from the body at large when the brain is at work. Here, then, is the explanation of weariness; here the reason why men of letters, who labour successfully, feel it requisite to live well, to rest thoroughly when they do rest, and to divert, by moderate physical exertion, a free current of blood to the muscular and secreting organs between the intervals of repose and labour.

Those who are not well versed in physiological learning will be led by simple common sense to see that while literary exertion may be rendered compatible with a healthy life, it must inevitably, when carried beyond due bounds, prove speedily and specially hurtful. For when the man of letters hangs too long over his table, he combines all the evils which pertain to the copyist with those which belong to the thinker. More than this, the brain itself is not an organ which bears ill-treatment. Intimately con-

nected with every part of the body, having the forces of all either directly or indirectly under its control, it borrows, when it is overtaxed, force from the other parts of the organism, and sets them out of gear. The stomach wants force, that it may produce the gastric fluid, and move actively on food introduced into it; the intestines require force for their functions; the liver requires force, that it may eliminate its secretion; the kidneys require force, that they may excrete their fluid; the heart requires force, that it may beat rhythmically and with power; the muscles of respiration require force to sustain breathing; and from all these must some force be taken when the brain robs that from which the force is derived—the blood. Thus, from mental overwork, symptoms soon present themselves which tell their own tale. The stomach does not digest; the heart becomes irregular in its action; the muscles of respiration become feeble and the breathing embarrassed; the liver inactive; and the kidneys disordered, now throwing off large quantities of pale fluid, anon ceasing to act for many hours. In the end the brain itself undergoes change,—sometimes in its blood-vessels, which all through the great effort are bearing undue pressure; sometimes in its own structure, more frequently both in vessel and structure at the same moment. We physicians say the organ undergoes softening (*ramollissement*), and we name from this state numerous secondary diseases,—dementia, paralysis, diabetes, and, in some instances, epilepsy.

The diseased conditions described as following upon mental overwork are necessarily quickened and intensified by various surroundings and impulses, to some of which I must refer. The character of the writing—or, *I had better said*, of the thinking, is an important element. The staid man, whether engaged in

science, history, fiction, poetry, or aught else, works hard and easily; while the enthusiast, who gallops after discoveries, clutches at theories, strikes at the whole history of the world, as if it were comprised in a nutshell that requires only to be cracked by a series of skilful and rapid blows; the poet who would electrify his manly compeers before he is himself a man; the sensation novelist, who thinks he can surpass nature, and flatters himself with the absurdity of being able to plan positions and plots which could not possibly occur out of his own *imaginings*;—most of these go to the grave the foolish victims of an ephemeral fever, dying before they have begun to live, feeding, it may be, a popular excitement, but forgotten before they have well begun to die. For their own present's sake—for their future—I would conjure these enthusiasts into a sounder life of action. I would ask them to forget Rousseau and Kirke White, and to think of Newton, De Foe, and Milton.

Another evil arises from want of order in mental work, and from neglect of those purely physical acts on which the real success of mental work is actually based. When a literary man, in the absorption of his studies, and harping under the ridiculous impression that, at whatever cost, every happy thought must be chronicled at the moment, allows himself to forget his meals, he is going to destruction as fast as his mental legs can carry him. He soon ceases to sleep soundly; lies down to sleep with his head full of wanderings; rests a few minutes or hours, and is up again pen in hand, to record some new impression which he is conscious he shall forget. Forget! yes; because his memory is really going, and the signs of mental decay are filling up his own pictures. We may, indeed, take it as a rule, to which there is no exception, that whenever the brain during hours of sleep is occupied

with dreamy recollections of the work of the previous day, and whenever during work the absorption is so prolonged that the stomach ceases to make its ordinary demands, the scholar has passed the bounds of physical possibility, and will soon be no scholar at all.

Another evil is the resort to methods of artificial stimulation when the organism is wearied. When, instead of leisure, relaxation, or sleep, recourse is had to alcohol, tea, strong coffee, and the like, direct injury is superadded. Habits, moreover, are induced which in the end tell against the literary effort itself; for in time these *artificials* become requirements, and work is performed upon them which, like themselves, is false in principle;—in a word, they cannot make new brain-stuff, but at best can only whip old brain into weak action.

The last evil to which literary men are in these days subjected is that of working against time. To have to write in a limited period a given number of sentences; to have suddenly to collect new materials; to have to infuse, *to order*, force, character, argument, sophistry, or what is vulgarly called “spice,” into an article, *hoc opus, hic labor est*,—that is the crying grievance of the literature of our day,—that’s its peril.

We are astounded as we come to our breakfast-tables in the morning to find them teeming with a literary feast, which a few poor pence can buy. “Ah!” say we, “what a wonderful thing that Mr. Gladstone or Mr. Bright should have addressed the House at midnight, and that here, with the rolls and coffee, there should be half a dozen leaders analyzing and criticising those speeches, or prophesying on them, if need be.”

It is very wonderful, but is it not too wonderful to be *sound and satisfactory*? Would not the slave who *in the early morning* is struggling away, with the

printer's devil at his elbow, be better in bed resting, for the work of the day that follows? Would he not stand a surer chance of teaching the nation sounder doctrines, and of leaving to its children thoughts and arguments that would do more honour to his name and to theirs? Surely there is not a reasonable man who will give a negative reply to this question. But however men may answer it, nature answers it decisively enough. She tells with unfaltering voice, in the speedy destruction of these temporary giants in literature, how soon the physical power succumbs to the mental overstrain, and why the effort of the too ready writer is one of the least enduring and the most fatal.



## PART III.

### ON INJURIES TO HEALTH AND LIFE DIRECTLY CONNECTED WITH THE WORK OF DIFFERENT WORKING CLASSES.



## CHAPTER VIII.

### INJURIES FROM MECHANICAL CONCUSSIONS.

**I**N all mechanical occupations there are some dangers of exposure to accident, and many of these are so obvious,—as for instance the danger that is connected with the office of engine-driving,—that no observation is called for from me respecting them. There are, however, certain other mechanical accidents, if I may so call them, which are not so obvious, and which deserve a short chapter.

The men who are most subjected to the injuries now being referred to are,—

Carpenters and joiners,  
Sawyers,  
Commercial travellers,  
Glass-blowers,  
Paviours,  
Iron-plate workers,  
Riders,—post-boys,  
Carriers of heavy weights,—porters,  
Waiters and coal-heavers,  
Coffer-dam sinkers,  
Postmen.

I might refer to many more who follow occupations

which are attended with mechanical risk, but the above-named are the most important.

*Carpenters and joiners* are not an unhealthy class as a whole; they stand indeed in a fair place in the scale of vitality, but they are subjected to concussion in performing some parts of their work. In planing wood, for example, there is produced a concussion which extends through the chest and tells indirectly upon the circulation. I have shown in one of my purely medical treatises that in the carpenter there is almost always to be heard under his left collar-bone a peculiar murmur with each beat of his subclavian artery. In time this concussion is felt by the heart, and so it often happens that the heart-beat of men employed in the manner described becomes irregular and enfeebled.

*Sawyers* are subjected to a somewhat similar concussion; but in their case the concussion is felt more directly by the chest, and the heart suffers more severely in a shorter time. The back also becomes bowed and the limbs very much unfitted for any other duty except that of sawing. The occupation, however, is not unhealthy: the vitality of the sawyers as a class is good.

*The commercial traveller* is subjected to constant vibration in the railway-carriage, and not unfrequently suffers from that cause of vibration to a severe extent. He feels at first nothing that he considers to be important, but by-and-by he experiences a sensation of vibration which extends along the spine, and is, if not painful, uncomfortable. If this be borne for many months, as is often the case, the digestive functions are impaired, there is dizziness, frequent headache, and, in the worst class of cases, deficiency of power with numbness in the lower limbs. As a rule, the symptoms subside under rest and judicious treatment, but I have known an exceedingly troublesome and


painful condition of body produced from this cause. The evil is much exaggerated doubtless by other circumstances than the mere vibration of the carriage. The hardness of the seat in the third-class carriage is further prejudicious; and the shrill whistle of the engine in the stations, with the constant bustle and worry and excitement, all add also their share to the mischief. The development of it, however, seems to be in the pure mechanical vibratory manner above described.

*Glass-blowers* are subjected to direct mechanical injury from the manner in which they forcibly inflate their lungs in blowing glass, while it is in the molten state, into the different forms in which we see various glass-blown bottles, globes, and other similar articles. The deep inflation of the lungs produces, in course of time, extreme distention of the minute air-vesicles. The distention causes permanent enlargement, almost of necessity, and often rupture of the thin walls of which the fine air-vesicles of the lungs are constructed. There is thus set up the diseased condition of lung called emphysema, a disease attended with shortness of breath, an inability to charge the blood freely with oxygen, an easily reduced temperature of the body under adverse circumstances, and a general debility, which in comparatively early life is a disablement. I regret that the official tables do not specially record the rate of mortality of glass-blowers with the rest of the well-defined industrial classes.

*Paviours.*—Men who, while engaged in the laying of stones, and who use the large heavy implement called the rammer, suffer severely in the chest from one particular act connected with their work. As they let down upon the laid stone the heavy rammer, they force out of their chests a large volume of air. They

produce by this movement a curious noise like a long sigh, and they think that by this means they in some manner relieve themselves of strain of labour. This idea is purely imaginary, and the injury inflicted by the practice it engenders is of a serious kind. It brings on a dryness of the throat and hoarseness, a sense of exhaustion in the muscles of the chest, and a feeling of emptiness within the chest. After a few years the constant mechanical strain tells on the breathing organs themselves. The bronchial tubes are rendered unduly large, are, in fact, dilated, and are deprived of their elasticity; the fine air-vesicles are ruptured in points, so that the diseased condition I have already described as emphysema is produced, and the heart, feeling the embarrassment, is made irregular in its action and imperfect in the performance of its duty. In fact, I know of few men who suffer more severely than paviours. I have attended many of them, and I have tried to reason them out of the practice into which they fall by example; but I fear that it will be a long time before they will be induced to take advice on the subject. They are content to attribute all their ailments to any and every cause except the true one.

*Iron-plate workers*, in addition to accidents from fine particles of iron entering their eyes, are subject also to injury resulting from the constant noise attending their work, specially during the process of riveting. The ear is the organ which is mostly influenced in their case; they are deafened, in some instances markedly, from the constant din, and in rare instances the circulation through the brain is affected, so that giddiness and nausea follow as results. These phenomena are most observed in the early career of the worker; they are diminished when



the sensibility of the ear to the persistent sound is decreased.

Another affection to which those who work at iron with the hammer are occasionally subject is a failure of power in the muscles of the arm which wields the tool. The muscles experience a singular thrill, which amounts in time to a sense almost of pain, and in the end to a numbness, with a failure of readiness to hold or grasp the hammer. When these symptoms are established, they continue as a rule, and render the worker unfit for the occupation.

Persons who have to ride regularly every day on horseback, and soldiers, especially artillerymen, are subject to a disease of the great bloodvessels called aneurism, that is, an enlargement, from dilatation, of an artery conveying blood from the left side of the heart over the body. The seat of this disease is usually in the ascending part of the great aorta, the large vessel which arises immediately from the heart. So common was this disease amongst postboys in the old posting days, that it obtained the name of the postboy's disease. It is met with now much less frequently than it used to be, but in the army service it is still not uncommon.

*Porters*, who carry heavy burdens, and *waiters*, who carry heavy weights up and down long flights of stairs, are liable also to aneurismal disease. I have seen aneurism of the ascending aorta three times at least in waiters who have been obliged, as a daily duty, to make ascents, bearing weights, and twice in porters. Both classes, together with *coalheavers*, are also liable to affections of the heart, from the labours to which they are exposed. The heart at first becomes large, then unduly nourished, and finally disabled. All these classes are, as a rule, very short-lived, but

as they do not come under any distinct head in official returns, being commonly classed as labourers, or as indefinitely occupied, their high mortality is not generally made known.

*Coffer-dam sinkers*, who work in closed chambers under great atmospheric pressure, are made to suffer from an affection to which the name of "Caisson, or coffer-dam disease," has been applied by Dr. Andrew Smith, of New York. While these workers are in the coffer-dam, bearing a pressure of perhaps three atmospheres, the colour of the dark blood in their veins is changed to the colour of the bright red arterial blood, and the pressure on the drum of the ears is painfully acute. The most painful symptoms occur, however, on leaving the dam, and when the atmospheric pressure is reduced. Then the worker feels in an extreme degree those pains in the joints, rheumatisms and neuralgias, which many other persons realize on what is called change of weather, when rain is expected. Caisson disease sometimes assumes a serious character, so that the worker is altogether disabled.

*Postmen*.—Our good and useful friends the postmen are not without their special injuries incident to their work. The constant rapid exercise to which they are exposed, lays them open to over-action of the heart, and, in many of them, to comparatively early decrepitude from that cause.

## CHAPTER IX.

### INJURIES FROM DUSTS.

THERE is another series of injuries connected with certain industrial callings in which the effect produced is not due to mechanical shock or pressure, but to the inhalation into the lungs of some foreign agent, which is the cause of the danger or inconvenience. Agents which injure by these means are of three kinds :—

(a) Some are insoluble particles—dusts.

(b) Some are soluble substances.

(c) Some are gases or vapours.

It will be worth our while to study this subject with a little care.

#### *Dusts.*

The industrial workers who suffer most severely from dusts are the following :—

The potter,  
The millstone-cutter,  
The quarry stone-cutter,  
The pearl-cutter,  
The sandpaper-maker,  
The needle-maker,  
The knife-grinder,  
The hemp and flax dresser,  
The worker in rags and in wool,  
The miller and flour-worker,  
The wood and ivory turner,  
The walkingstick-maker,  
The hairdresser,  
The miner,  
The trimmer,  
The fur-dyer,  
The fur-packer,  
The ropemaker.

The kinds of dusts taken into the lungs by persons engaged in the avocations above named vary in quality and inflict different degrees of mischief.

*The potter* suffers most severely of all at the present time. He draws into his lungs a fine earthy or silicious dust, which causes an extreme irritation and ultimately a diseased condition, to which the name of potter's asthma has been applied. The disease is very fatal, and from the effects of it, coupled with exposure to lead and to some other hurtful influences, the life of the potter is one of the lowest in the scale of mortality in this country. Like the publicans, the potters die at the rate of 138 to 100 of those who follow seventy well-defined occupations.

*The millstone-cutters* and the stonecutters are subjected to the dust of fine particles of stone, which are given off from the material they are subjecting to the chisel. The late Dr. Alison, Professor of Medicine in the University of Edinburgh, wrote in his day that there was scarcely an instance of a mason engaged in hewing stone in his city who lived free of consumptive disease at 50 years of age. In this day, owing to many improvements in modes of work, the mortality is less formidable, but it is still great. The cause of danger in this instance is from the reception by the lungs of small particles of stone dust, which create extreme irritation and destruction of the minute structure of the lungs.

*The pearl-cutters* are in like manner affected by inhaling minute portions of pearl-dust, and as they live and work in close rooms, they are specially liable to danger. The dust is light, tasteless, and easily carried into the lungs, where it creates serious disease. Nor does the mischief end here. The internal layer of the pearl is an organic material which is soluble in

water, and which has received the name of *conchyoline*, and this substance, separated in the lungs from the calcareous matter which is mixed with it in the pearl, is dissolved and carried by the current of the arterial blood from the lungs into the arteries, and thence into the minute vessels of the circulation. In the minutest of these vessels, in the portions of the ends of bones, near joints, called the epiphyses, the foreign substance causes irritation and swelling and pain, and other symptoms resembling acute rheumatism.

*The sandpaper-makers* suffer from the effects of minute portions of glass and sand which they inhale as fine dust. More than twenty years ago I reported on this danger, having met with some instances in which young children were fatally injured and in a very few weeks died from acute inflammation of the lungs, induced by the particles of dust. A better provision for ventilation and for the distribution of the powdered substances on the adhesive paper has now to a large extent abated this evil.

*The needle-grinders and knife-grinders* are in like manner exposed to danger, and at one time their mortality was terrible. The hemp and flax dresser is subjected to great danger from the inhalation of dust. Many years ago Thachrah called special attention to this point, and he was not the first to give the warning. At present the evil continues. The dust from the flax and hemp is specially irritating, and Dr. Purdon, of Belfast, who is one of the ablest Inspectors of Factories, states that amongst the carders in the flax-working factories under his care the destruction of life is so great that if a girl under 18 gets a card, she very rarely lives beyond 30 years, if she be constantly employed at her work. She dies of the consumptive disease of the lungs induced by the work.

*Workers in rags and in wool* suffer in like manner

from dust, and amongst some who work in wool there is developed occasionally an acute disease partaking of the character of one of the so-called zymotic diseases, by which life may be terminated in a few days.

*The miller and flour-worker*, by inhaling the flour dust, is subjected to a disease of the lungs called, vulgarly, millers' asthma. It is a painful and severe affection, but is not so fatal as the potter's asthma, the particles of flour being less hard and less irritating. The miller sometimes suffers in hot weather from irritation of the mucous membrane of the eyes, —conjunctival irritation,—owing to the effects of the flour-dust.

*The wood and ivory turner* suffers from the effects of dust, and sometimes the wood-turner, when he inhales the dust of coloured woods, such as mahogany, coughs up a secretion or phlegm, which is coloured by the dust and which is extremely irritating.

*The walkingstick-maker* is liable to injury from inhaling the fine particles of charcoal dust which are given off from sticks after they have been darkened by the process of charring and are being scraped in order to bring them to the desired tint. The disease so induced is an irritation of the bronchial tubes, a chronic bronchitis.

*The hairdresser* is made to suffer from the irritating dust, consisting of the ordinary dust common to the air of a close room, in combination with the minute particles of hair which are produced in cutting the hair by the scissors. The mortality of the hairdressers, 127 as compared with 100 as the standard of 70 occupations, is an indication of the serious danger of their occupation.

*The miners* in the coalmine are made to bear, in some instances, a disease entirely due to the inhalation of

particles of fine coal-dust. The structure of the lung is rendered dark in colour; and the term "miner's lung" has been applied to the diseased condition under which the miner suffers.

*The trimmers*, those who are engaged in trimming furniture and bedding and who are confined in close work-rooms, where fluff is largely distributed, are often subject to bronchial irritation and cough.

*The fur-dyer* is subjected to many sources of danger, and amongst these not the least objectionable is the dust which arises when the furs or skins are beaten to knock out the iron-saline dust which has been introduced in the dyeing process. This dust is irritating and a source of great suffering. At one time all workers in the fur-dyeing business were more or less affected, and I have met with some severe forms of disease amongst them. Now, by an improved mechanical procedure the risk is considerably reduced.

*The ropemaker* like the flax-dresser is affected by the hemp dust, but not to the same extent. The hemp or flax by the time it reaches him is much freer of dust, and when his rope-walk is in an open shed he is very much protected from the effects of dust. He is nevertheless subject to some risk, and very few workers escape altogether from cough and bronchial irritation.

## CHAPTER X.

## INJURIES FROM CONTACT WITH SOLUBLE COMPOUNDS.

A SECOND class of injuries connected with occupation are induced by contact of the body with substances which are absorbed by the skin, by the lungs, or by the alimentary surface into the blood, and are carried by the blood into the system. One illustration of this kind has been given in the case of the pearl-workers, who absorb portions of the internal surface of the mother-of-pearl, and who suffer, as a consequence, from a peculiar affection of the bones. The others, who suffer most acutely from the effects of absorption of substances which are foreign to the body, and which affect locally or generally, are the following :—

Artificial flower makers and paper-colourers.

Cigar-makers,

Workers with mercury,

Workers with lead—painters, potters,

Bronze-founders,

Workers with bichromate of potassa,

Workers with phosphorus,

Workers with paraffin,

Chimney-sweeps,—soot-men.

*The artificial flower makers, and some who are engaged in the process of colouring certain wall-papers, suffer from the effects of arsenic, which is used for colouring purposes. The arsenical compound is absorbed by the skin as well as by the lungs, and sometimes portions of it are swallowed accidentally with the secretions of the mouth, and so find their way into the stomach. Thus the action of the poisonous agent may tell on the surfaces of three of the vital organs,—the skin, the lungs, and the stomach. The local ir-*

ritation produced by the substance is of itself considerable, causing cough and irritation of the bronchial passages. But in addition there is, in these cases, a more general mischief. There is a painful irritation of the stomach, and indigestion, with disturbance of the bowels, pain, and, in extreme examples, ulceration. To delicate persons, to girls for instance, who are exposed to this insidious action of arsenic in flower-painting, the effects of the poisons are most serious, and occasionally fatal.

*The cigar-maker* is subjected to another kind of agent which is double in its action. The dust which is diffused through the air of the room or factory in which he works is charged with some part of the dust of the tobacco-leaf. The dust itself is irritating to the lungs, and I have seen a well-marked series of bronchial symptoms from this cause alone. A much more serious evil is, however, induced by the absorption into the body of the active and poisonous substance of the tobacco, the nicotine. This substance absorbed into the blood and carried into the body affects the blood itself, affects the nervous matter of the nervous centres,—the brain, the spinal cord, and ganglionic nerves, and through them disturbs the natural function of the muscular organs, including the heart itself, as well as the involuntary muscular fibre of the stomach and other parts of the alimentary system. The worker, consequently, becomes nauseated, deficient in muscular power, subject to irregular action of the heart, and unsteadiness of the circulation. In course of time what is called a tolerance to these symptoms is set up, and the worker seems to be able to resist the derangement to which he is being subjected. But through all his career he is frequently disturbed in health by his occupation, and rarely is able to continue it for a prolonged time.

Some men are at once disabled, and never are able to secure immunity from the action of the poison.

*Workers with mercury*, men who are engaged in looking-glass manufacture, and in other pursuits in which mercury or the salts of it are employed, are subjected to danger from the absorption of this metallic poison into the body. These men, when they are brought under the influence of the mercury, are affected in the glandular organs, especially in the salivary glands, which are greatly irritated and may become acutely enlarged and inflamed, with copious secretion of saliva. In other instances the nervous system is affected, and through the nervous system the muscular, so that muscular movements or tremors are set up, which are injurious to the steady action of muscle, and to muscular capability of a natural kind.

*Workers with lead*, such as lead-painters, and those potters who in the glazing process of pottery, dip the ware into a solution containing lead—dippers, are extremely liable to be made ill by the absorption of lead into the body. The lead enters the body in two ways. Some of it is directly absorbed by the skin, and, according to many skilled observers, this is the common, if not the only, mode in which it is absorbed. I am, however, convinced that the poisonous lead salt is often swallowed accidentally with food conveyed to the mouth by the hands, which have not been properly washed previous to the meal. The symptoms caused by lead are colic, spasmodic intestinal pain, and paralysis of the voluntary muscles, especially of the extensor muscles of the forearm by which the wrist is raised. Hence the terms "painter's colic" and "drop-wrist" are in frequent use as significantly describing the action of lead on the body.

*Bronze-founders* are occasionally exposed to a serious source of danger from being brought into con-

tact with the fumes of oxide of zinc. These fumes are apt to settle on the lips of the men who are at work, and in that way the zinc oxide finds its entrance into the body. The symptoms it produces are those of choleraic disease, cramp, and water-brash,—an exudation of acid fluid within the stomach.

*Bichromate-workers*, men who are engaged in making bichromate of potassa on a large scale, are liable to be affected by the exposure of parts of the body to the bichromate salt. If the salt gets into a wound, or on to an open sore, it produces an extensive ulceration or death of the part with which it comes in contact, and that ulceration may extend very deeply. The salt has been known to affect the internal mucous membrane of the nostrils of the workers, and even to destroy the septum or division between the nostrils altogether. Some of the animals that are employed in bichromate-works are affected in a similar manner, and in the horse the foot has been destroyed. It has also been observed that small animals, such as mice and rats, that have traversed the floors of factories on which the bichromate dust was strewn, have lost their feet by reason of this form of ulceration.

*Workers with phosphorus*, those who are employed in the manufacture of phosphorus matches, are exposed to the risk of a very painful and serious disease of the bones, the jawbone being the part chiefly affected. The disease consists of a real destruction of the bone, death of it, with attendant ulceration of the softer parts surrounding it. The disease has obtained the name of phosphorus necrosis. It causes not only local injury but great debility and disturbance of the body altogether, while it leaves as a result a terrible and permanent disfigurement of the face. Happily the improvements which have been

made in the manufacture of lucifer-matches, and especially the improvement of the match which strikes only on the box, has led to the all but actual extinction of phosphorus necrosis.

*Workers in paraffin*, men who are engaged in using the crude paraffin, or shale, are liable to an affection of the skin which is both painful and loathsome. The paraffin oil finds its way into the small cavities from which the hairs on the skin emerge,—the follicles. The follicle enlarges, the bulb of hair in it is separated, and the hair is destroyed. Then the space which was naturally occupied by the hair and its bulb is filled with oily matter, and dust or dirt, and the parts surrounding are much inflamed. The backs of the hands and lower portions of the arms are the parts usually affected, but any part of the body where there is growth of hair, and which may come in continual contact with the oil, will be similarly influenced. Recovery takes place after the skin ceases to be subjected to the influence of the paraffin, but the surface is left very much changed and marked with scars, almost like smallpock marks, in a permanent manner.

*The chimney-sweep* and worker in soot is liable, from contact with soot, to an ulceration, which may assume a dangerous character, the ulcer extending deeply into the tissues. This ulceration has been called soot-cancer, owing to its sometimes malignant character in persons who are disposed to cancerous disease.

## CHAPTER XI.

### INJURIES FROM NOXIOUS VAPOURS.

IN the pursuit of many occupations there are injuries inflicted by the inhalation of what are called noxious vapours. Some of the evils thus inflicted are insidious in their progress; others are from the first known to be injurious, and indeed are felt to be so as soon as the persons who experience them are exposed to their cause.

The following are amongst the principal of those who suffer from this class of cause of industrial disease.

The lace-frame worker,  
The straw-bleacher,  
The fellowship porter,  
The hatmaker,  
The aniline dye manufacturer,  
The balloon-toymaker.  
The photographer,  
The alkali-maker,  
The fur-dyer,  
The chemical manufacturer,  
The brushmaker,  
The copper-smelter,  
The painter.

*The lace-frame workers* subject themselves in cold weather to the fumes arising from a coke stove which they are in the habit of placing under their work, as it stretches out on the frame. The glow from the burning fuel beneath warms their fingers, but they are exposed to fumes of a very dangerous character. There is no visible smoke from the fuel, and yet there is a dangerous exhalation. From the chafer is evolved

carbonic acid gas, and worse still, carbonic oxide. The first of these gases is suffocative, and is injurious, if so little as one per cent. of it be present in the air breathed. The second is directly more hurtful, and in much smaller proportion. It causes headache, nausea, giddiness, and irregular muscular power, with palpitation of the heart. The injury is self-inflicted; and though I fear, it is still very commonly self-inflicted, it is quite unnecessary, and is the mere result of ignorance on a simple but important subject.

*The straw-bleacher* is often affected by the inhalation of sulphurous acid, which is given off from burning sulphur used for bleaching the straw that is afterwards employed for bonnet-making and for other similar purposes of straw-weaving. The symptoms are those of choking and difficult breathing in the first instance, followed by bronchial irritation and troublesome cough.

*The fellowship porters* who carry corn are subjected to the same influence in instances where the corn has been bleached by sulphurous acid. In their case there is another element of mischief superadded, in the dust which rises from the corn, which is very irritating to the bronchial surface.

*Hatmakers* are affected, in one part of the process of hat-manufacture, by the vapour of ammonia. The ammonia is used to act as a solvent to the shellac with which the body of the hat is made stiff. After the solution is applied, heat is applied to cause the ammonia to evaporate and leave the shellac in combination with the fabric. The ammonia vapour causes cough and difficulty of breathing. It also passes into the blood from the lungs by absorption, and renders that fluid unduly thin and uncoagulable. This, in turn, produces a paleness of body and a feebleness which, though temporary in its nature as a form of

disease, is distressing and preventive of the full development of strength in the person affected.

*The workers in the aniline-dye* manufactories are occasionally liable to danger from inhalation of vapour, by which insensibility is produced, followed by a blue discoloration of the skin. The accident is very rare, but it deserves notice.

*Toy-balloon makers*, men and women who are engaged in the manufacture of the variously coloured elastic bags called toy balloons, are subjected to much danger from the inhalation of the vapour of bisulphide of carbon in which the india-rubber is immersed and partly dissolved before the balloons are blown out. The effect of the vapour is most injurious to the mind as well as the body. The workers become depressed in spirits, they lose appetite, they are emaciated, and some of them are actually rendered imbecile and insane.

*Photographers* are exposed to the vapours arising from the use of the cyanides, and are thereby for a time affected. They are rendered dyspeptic and depressed, with frequent sensations of nausea and occasional giddiness. I have also recorded an instance that came under my own observation, in which a photographer was affected by the cyanide, not only from the inhalation of the vapour but through the absorption of the salt by his hands, which were chapped and had the skin broken in parts. In this case the symptoms induced were most severe, the nervous system being extremely disturbed, and the bodily strength for a time extremely reduced.

*Alkali-manufacturers.*—The men who labour in the works in which sulphuric acid, washing-soda, hydrochloric acid, and chloride of lime are produced, suffer from the inhalation of sulphurous acid in the gaseous form, of the vapour of hydrochloric acid, and of

the gas called chlorine. The amount of suffering induced is not, however, so severe as might be at first expected, and a very careful inquiry on the subject which I have recently made in large alkali-works has convinced me that many of the statements which have been circulated have been exaggerated. The fact is, that exposure to the gases I have named, in the condensed form in which they are generated within the factories referred to, is so extremely dangerous to life that the greatest possible care is taken by the men to avoid the danger. The men who have to enter the chlorine chambers are those who suffer most, for to breathe the smallest portion of the chlorine gas is to experience the most painful constriction of the chest, cough, irritation of the throat, and violent action of the heart. To prevent the exposure to this danger, the workmen surround their mouths with wet towels, by the water of which much of the gas is absorbed; they also let air freely into the chamber before they enter it, and they learn now to hold the breath if they detect the presence of the gas, until they can get away from it. In this manner they escape, almost beyond expectation, from immediate danger. Some of them suffer from what they call asthma, that is, short bronchial breathing, and complain of severe oppression of the chest; but I am bound to say that even this oppression is less than would be considered probable if the facts of experience were not present to correct the inference that might otherwise be naturally drawn.

*The fur-dyer*, as we have already seen, is subjected to discomfort and danger from the inhalation of dust. He is subjected to yet another risk in inhaling the fumes of nitric acid. The acid is used in the business to remove fatty matter from the furs or skins and to give certain shades of colour to the fur. The acid

produces difficulty of breathing, with dryness and redness of the throat, constipation of the bowels, and pain at the back of the head.

*Men engaged in chemical manufactories* are open to accident from the inhalation of the gases and vapours above named, from sulphuretted hydrogen, and from some other gaseous compounds. They are also exposed to dusts which are of irritating quality, but I am not able to refer to any very marked evidences of permanent injury from these causes in the class of workers specified.

*Brushmakers* suffer, in some instances severely, from the effects of resinous fumes, which rise from resin when it is heated in oil for the purpose of making it fix the bristles, of which the brush is composed, into the handle of the brush. The fumes cause a suffocative cough, which becomes in some workers persistent and so troublesome that they have to give up the occupation.

*The copper-smelters* are afflicted by the fumes which rise in the process of smelting the copper ore, and called commonly "copper smoke." In this smoke there is really very little copper, the copper being deposited in the culverts, and not finding its way into the air. The smoke as it escapes into the air contains sulphurous acid, sulphuric acid, traces of arsenic and free carbon. The action of the smoke is, however, severe on many of the workers, causing in the young bronchial irritation, and in the old what are called asthmatic seizures, sharp attacks of cough, and bronchial spasm.

*House-painters*, who use "turps" in their work, are subjected to the action of turpentine vapour. All workmen are not influenced; some escape entirely, others are never quite free from the injurious action of the vapour so long as they are exposed to it. The

mischief is most brought out in what is called the process of flatting. The symptoms produced are distinctive enough in character and are readily distinguished from those caused by lead, with which they were at one time confounded. The symptoms induced are those of great weakness, coldness of the surface of the body, constipation, headache, giddiness, and disturbed nervous function generally. Headache with loss of appetite are, I think, the two most common symptoms from inhaling turpentine vapour. It has been shown by recent research that the vapour absorbed into the blood causes relaxation of the minute blood-vessels, with congestion of the brain and other large internal organs.

*Dr. Farr's Summary of Health and Work.*

In the twenty-fifth annual report of the Registrar-General of births, deaths, and marriages, published in 1875, Dr. Farr gives the following valuable series of facts relating to the health of the working community. They form so useful a supplement to the chapters that have gone before, that I introduce them in their entirety, changing only the position of the classes, so as to make them follow in more perfect consecutive order, and condensing here and there :—

“The clergy of the Established Church, Protestant ministers, Catholic priests, and barristers all experience low rates of mortality from ages 25 to 45. The clergy lead a comfortable, temperate, domestic, moral life, in healthy parsonages, and their lives are good in the insurance sense. The young curate compared with the young doctor has less cares.

The mortality of Catholic priests after the age of 55 is high : perhaps the effects of celibacy are then *felt*.

Solicitors experience the full average mortality after the age of 35. The legal work is hard.

Physicians and surgeons from youth up to the age of 45 experience a mortality much above the average. Many young practitioners have hard struggles to encounter. They are in contact with the sick, are exposed to zymotic disease, and their rest is disturbed. In states of depression, deadly poisons are at hand. There is an excess of practitioners in cities. Country practitioners have to visit their patients in all weathers, at all hours. The causes from which the medical men suffer demand careful study.

Chemists and druggists are younger than medical men, because pharmacy is a separate business, and is of more recent growth. Their mortality, like that of medical men, is high and above the average, especially in the younger ages. Manufacturers of chemicals, dyes, and colours also experience a mortality above the average.

Veterinary surgeons and farriers, of the age of 25 and upwards, experience a very high rate of mortality; higher than physicians and surgeons.

Publishers and booksellers fare well in health and life. They are generally masters in better circumstances than their confederates, bookbinders and printers, including masters and men, who often work in badly-ventilated rooms and die at a rate of mortality exceeding the average.

The mortality of London butchers exceeds that of country butchers, but would no doubt be lower if their cattle were slaughtered at public *abattoirs* and not in private slaughterhouses. At all ages after 25 the mortality of London butchers is excessive; it is beyond not only the mortality of all other classes in London, but beyond the mortality of the butchers of the rest of the country. The mortality of butchers'

boys is lower in London than that at the same ages—15 to 25—of all classes.

Fishmongers experience full as high a rate of mortality as butchers.

Commercial clerks experience an exceptionally high rate of mortality. The rooms in which they work are generally close and ill ventilated. They often stoop at their desks. They require Sir John Lubbock's holidays.

The railway service, taken collectively, experiences a high rate of mortality, somewhat higher than medical men at advanced ages.

Coachmen (not domestic servants) and cabmen experience nearly same high mortality as railway servants from the age of 20 to 35; after 35 the mortality is in still greater excess: the causes are probably drink, exposure to the weather, and violent deaths. The mortality of horsekeepers and grooms is, without hard exercise, nearly as high at the ages of 25 and upwards as the mortality of coachmen.

Tool, file, and sawmakers have among them the grinders, who suffer so much from sharp particles of stone and steel inhaled into the lungs; their mortality is still high, and at the ages of 45 to 65 excessive. The mortality of needle-manufacturers at 35—45 is excessively high.

Coachmakers of all branches, working in wood, iron, binding, and paint, up to the age of 45, experience a low rate of mortality; afterwards the mortality exceeds the average. They live in towns.

Wheelwrights, working chiefly in wood and scattered all over the kingdom, are healthy: their mortality is low at all ages.

To carpenters, joiners, sawyers, and workers in wood generally, the same observation may be extended: their mortality is low; their occupation is healthy.

The mortality of the blacksmiths, also scattered over the country and working in heat and iron, is higher than that of the wheelwright and carpenter.

The carver and gilder suffers less than he did; but both he and the plumber and glazier require further protection against the metallic poisons. The mortality is high among them from the age of 35; but at the age 45—55 it approaches 50 per cent. higher; at 55—65 it is near the ordinary mortality of men.

The wool, silk, and cotton manufacturing population no longer experience an exceptionally-high mortality. Lord Shaftesbury and his enlightened colleagues must be gratified, if not entirely satisfied, with the success that has crowned their life-long labours. And it is creditable to the millowners to find the men and boys in their employ suffering less than many other people in towns.

The people working in wool are the healthiest; at all the young ages their mortality is the lowest; at 45 and upwards the cotton-workers suffer much more than the workers in wool and silk.

The mercers and drapers are not so healthy a class as could be desired; their mortality is above the average; especially is this the case from 25—45. Perhaps much of their indoor work is better suited to women than to young men.

The hairdressers, barbers, and wigmakers, the English Figaros, living chiefly in cities, experience, according to these returns, high rates of mortality at all ages; and so do hatters.

Shoemakers at all ages, except 20 to 25 and at advanced ages, experience a rate of mortality below the average.

Tailors on the contrary die at rates much above the average. But for their health and for shoemakers,

both classes counting more than 300,000 men, much remains to be done.

Bakers experience a mortality very little above the average, and that is chiefly at advancing ages.

Grocers at all ages after 35 experience a low rate of mortality.

The tobacconists, snuff and tobacco manufacturers, suffer very much at all the younger ages, indicating clearly enough how prejudicial smoking is to young men. They present a strong contrast at the corresponding ages to tanners and curriers, who are healthy up 45, and then show signs of suffering.

The earthenware manufacture is one of the unhealthiest trades in the country. At the age of joining it is low; but the mortality after the age of 35 approaches double the average. It is excessively high; it exceeds the mortality of publicans. What can be done to save the men dying so fast in the potteries and engaged in one of our most useful manufactures?

Among the glass-manufacturers the mortality is higher at 25-35 than among the earthenware-manufacturers, but much lower afterwards.

The men engaged in copper-manufactures from 20 and upwards experience a mortality somewhat above the average. At 55 to 75 their death-rate is heavy, much heavier than it is among the workers in brass and in iron.

The men in the iron-manufactures do not die at the average rates under 45; after that age the average is exceeded.

Working in wood on the whole is comparatively cool compared with working in iron. The loss by perspiration is excessive among such men as puddlers, and they require a great deal of drink, which should contain little or no alcohol.

Taken in the aggregate, the metal-worker—the metallic man in all England—does not experience the average rate of mortality under 45. After that age the table turns against him, and his losses grow heavier and heavier every year.

Miners in the aggregate experience a heavier rate of mortality, largely from violent death, than metal-workers; and the mortality of both classes greatly exceeds that of the agricultural labourer.

Independently of the influence of the material and of the work itself on health, the place in which men work exercises so great an influence that it has to be taken into account in judging of the salubrity of their occupation.

Man is naturally an open-air animal. He is made to work, and the sky is his native covering. So, after taking everything into account, the hunter, the sportsman, and the husbandman in a cultivated land are at present the healthiest of all workmen. All would no doubt be the better if the higher parts of the brain had their due share of activity; and this, though not often the case now, we may hope will come.

Gamekeepers offer an example of the healthiness of out-door life. Their mortality is very low. The exercise of genuine sport is no doubt as salutary to the amateur sportsman as it is the professional descendant of the hunters of old.

The farmers and agricultural labourers are at present among the healthiest classes of the population classified according to occupation. The young farmer, for some reason or other, suffers a higher mortality than the labourer; but at 35 and upwards the British farmer enjoys comforts which are beyond the reach of the labourer. It is probable that in no country the agricultural population is healthier than in England.

The English farmer is not poor, and he is not ill fed. The weather, it is true, troubles his mind; but against its severities he is well sheltered. His capital not being sunk in the purchase of land, he has more to expend on stock, implements, labour, and fertilizing materials. His profits are greater. No doubt the dirt which feeds zymotic disease, cattle and human alike, still pollutes the farmyards and the farm ponds; but foot-and-mouth disease, pleuropneumonia, and cattle-plague will in the end teach the intelligent farmer that in his management of all live stock cleanliness is next to godliness.

The mortality of the English farmer is not now high, but it may by care be reduced to a lower figure. To what is the high mortality of the young farmer of 15 to 25 due? Farmers' sons appear to be healthy. The labourer experiences a higher rate of mortality than the farmer at all ages after 35.

The numerous and, as a body, respectable men who supply drinks, innkeepers, suffer more from fatal diseases than the members of any other known class. There can be little doubt that the deaths are due to delirium tremens, and the many diseases induced or aggravated by excessive drinking. When frequent drinking, in small quantities, is carried on from morning till night, few stomachs, few brains, can stand it. The habit of indulgence is a slow suicide—the many deaths of publicans appear to prove this. Young publicans, 15 to 25, die at a faster rate in country than in town.

## PART IV.

### GENERAL RULES IN RELATION TO HEALTH AND WORK, TO MAKE WORK HEALTHIER AND LIFE LONGER.

#### CHAPTER XII.

##### WILL AND WORK.

THERE are some rules relating to health and work which apply both to mental and to physical work with equal force. There are some rules which apply specially to mental work and others which apply specially to physical work. I will in the first place touch briefly on those rules which apply to both forms of labour.

One of the first lessons that should be taught to every child, rich or poor, is that it is born to work. The Divine work never ceases, and the human cannot. The world is ever making its daily revolution on its own axis, its annual revolution round the sun. The winds are ever in motion, ventilating the earth, carrying away noxious agents, moderating temperature. The waters are ever in motion,—now as running streams, now as seas. The sun is ever at work, drawing up the water from the earth. Even the silent mountain-tops, though they seem to be at rest, are at work. On them the water raised into the vaporous state condenses and flows back upon the earth.

All inferior living things work when they are allowed their natural freedom. They work for their

food, to find it, to secure it, before they subsist on it.

Besides, these working plans which are visible to the eye or easily provable when they are not seen, there are worlds within worlds of infinitely minute work going on, which the unaided eye does not see. When there lies before us a plate of mites from a cheese, the mites look like a fine cloud of dust, lifeless and inactive. We put a point of this dust under the microscope, and lo! there is in view a colony of industry. All the insects are busy at their work. Some carry food, others carry the young and helpless: all seem as active and laborious as if they possessed the best intelligence. There are unseen labours of myriad kinds, by which the vastest results are steadily effected. Invisible gases are diffusing around us at all moments, bearing away from us what is hurtful, bringing what is useful. Mountains, islands, continents, are being silently formed, reformed, moved, and removed by the unseen work of nature. Nothing is idle except man in his worst estate.

And no man whatever is free from work. The heart of the idlest of his race is always at work, and so are a hundred other parts of his body over which he has no control. Even when the body is dead there is continued motion and work in the parts of which it is composed. The only idleness, therefore, that can be called idleness is the idleness of will,—the resolution that the limbs or the mind of a man shall not be worked by himself and at his own instance. This idleness is most detrimental in its effects. It is so in more ways than one. It is detrimental because it contravenes nature, and thus injurious in the widest sense of the term. It is injurious to the body of the idler and to his health. It is injurious to others who depend—and all do more or less depend—on

other persons' labour for their own life and health and happiness.

The work that a man performs is much or little, to a large degree, according to the spirit in which it is carried out. From our system of education it too often happens that work is looked upon as if it were an actual blight, as if it were to be avoided and evaded in every possible way and at every possible season. To save work, to cheat work, to put off work, to declare work unnecessary,—these are procedures which too often are actually considered commendable by persons in all classes, or, if they are not considered commendable, are considered excusable, and worthy, therefore, of being greatly practised.

A large amount of work, both physical and mental, is rendered harder and more wearing than is necessary by the constant friction that is going on between the will to work and the performance of the work. Samuel Johnson tells his own experience on this point with all that simplicity and honesty of purpose which belonged to his nature. He would go, he says, for some hours or days and do nothing, from the feeling that he was unable to carry out that which he desired. At last, by a distinct effort he would break from the lethargy, and going to work with the idleness of his will fairly conquered, he would get through an amount of labour which was a surprise to himself. My own experience tallies with that of the illustrious lexicographer to the letter. I am conscious of moments when it seems to me impossible to string myself up for any important task requiring prolonged exertion. But when I feel the necessity,—when I am, as it were, driven to the industry, after the commencement of it in earnest, the bad spell is broken. So I am accustomed to assure my boys, when they com-

plain of the same inaptitude, and I know they are not wearied from work, that they can get up and proceed if they determine on it, and that willing work is working fun.

What I have spoken above relates to work of a mental kind; but the same extends to physical or muscular work also, and it is the peculiar effect of voluntary idleness in this line of exertion that if it be indulged in, the muscles, which are specially educated for exertion, become enfeebled by the idleness, and the nervous centres which guide the muscles become inactive to guide. The idleness grows by what it feeds on, and the more the idleness is indulged the more confirmed it grows.

It is one of the most important parts in the education of industry of all kinds to encourage the will to go with the work. More than half the failures in life in men of all occupations are due not to an inability,—I mean a true natural inability,—of the boy or man or girl or woman to perform their allotted task, but from the dread—that word is really not too strong—of putting forth the full power into the work and of sustaining it. On the other hand, to those men who have achieved an unusual amount of successful labour, it is often matter of surprise that people should wonder at the result. The thing to them has been so easy they have never experienced the difficulties that others appreciate, and at which they wonder. Shakespeare thoroughly appreciated these facts when he said—

“Our doubts are traitors,  
And make us lose the good we oft might win  
By fearing to attempt.”

The whole of this argument is well and effectively illustrated by the difference we see in the work done

at work and at play, or at competitive sport. Boys and men, girls and women will express at work the greatest sense of fatigue, but they will leave work in a supposed state of exhaustion, and will add to what they have already done several hours of actual work in what they call recreation, which is often harder than the regular and wearying labour. A man will drill at volunteering, a boy will go through all manner of exercises in the gymnasium, a girl will run or skip or dance, a woman will dance for hours, a man will walk on an expedition of pleasure, and in all these cases the added exercise will not be felt because the mind goes with it and the will sustains it.

I do not make these comments as a bar to recreative pleasures. I only name the facts I have adduced, and which every one who is candid will admit, in order to indicate that when the mind goes with the pursuit the exhaustion from the pursuit, or, more correctly speaking, the sense from exhaustion, is much less acutely felt, and that to work well, easily, successfully, and economically for the strength, it is before all things necessary to train the mind to think of play as mere change of work, and of work as play.

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## CHAPTER XIII.

### HOURS FOR WORK.

THE hours in which work, whether it be physical or mental, should be carried out are pretty definitely fixed by natural law. The law, however, is very determinedly ignored by most classes of our modern society. In this respect modern life is behind the

life of the past. The old common-sense rule, eight hours for work, eight hours for play or recreation, and eight hours for sleep, carries with it a good division of time, and, prudently followed, would answer all purposes. These hours should be properly distributed. The eight hours devoted to work should commence directly after the end of the eight hours of sleep, and the eight hours of recreation should follow the eight hours of work. The times for these divisions should be directed as far as possible by the sun. The best hours for work are, without any doubt, the succeeding eight hours after sunrise; the best hours for recreation are in the latter part of the day; the best hours for sleep are when the sun is removed. In our English climate it would not be very possible to follow out this rule in all seasons. In midwinter season, for example, when the sun rises a few minutes after eight in the morning and sets a few minutes before four, only one period of eight hours of daylight, and that hardly complete, exists for work. But at this season also the said hours of daylight are the choicest and the most natural for every kind of occupation, mental or bodily, when the natural habit of working in that period is properly maintained. At the said season of the year the hours for recreation require to be somewhat curtailed, because more sleep is required in winter than in summer. It is advisable, therefore, to go to bed at least two hours earlier in the cold season of the year, to add at least one hour to sleep in the early part of the night and the same in the morning; or, better still, to add two hours in the early part of the night.

While dealing with this subject, the relation of hours of work to hours of recreation and sleep, it would be an omission of an important kind to avoid stating *a view* which has recently been put forward with con-

siderable force and ability by an American writer, that the natural hours for sleep and for activity, though they are nearly the same as those indicated by the absence and presence of the sun, are not absolutely the same. It is advanced in this view that there is some other external influence, as of an electric current, which has a regular ebb and flow, and which with its ebb leads to sleep and with its flow to wakefulness. It is further advanced, that the ebb of this current begins about half-past six p.m., becomes permanent at half-past seven in the evening, and continues till about four in the morning; that the flow commences a little after four and continues without interruption until noon, when there is a slight ebb, but with a quick return, which, having recommenced, lasts until six, when the long ebb is re-established. The inference drawn from this is, that the natural hours for complete rest are from half-past seven in the evening until four in the morning with a second short interval of rest at noon, and all this without actual reference to the sun.

I do not think that correct observation is so far advanced as to allow any one to say that the hypothesis of a current in ebb and flow here advanced, is anything more than an hypothesis resting on very slender foundations at present. But this must be admitted, that the hypothesis squares admirably with the best practical rule of life as to the times when rest from labour should be taken and when work of every kind is most efficiently carried out. Those who live longest and do most work are they who rise at all seasons of the year a little after four in the morning, never later than five in the morning, and who do not go to bed later than nine in the evening. Those also live best who are able to catch a few minutes of sleep at or about mid-day. I have noticed, moreover, from per-

sonal observation, when I have been able to conduct it, that there is really a natural disposition to go to sleep about seven or eight o'clock at night, which is soon realized, even in our present monstrous artificial life, if it be allowed to proclaim itself. I believe too that there is a natural tendency to a noon-day nap when nature is allowed her due sway. And I am sure that there is some potent influence for good in early rising, which is explained as yet by nothing but by the fact of early rising itself. I have known times in my own life when professional labours have kept me late from bed, but when such times have occurred I have been more lively and active on the following day, if I have even then risen early, than if I have tried to make up for lost time by sleeping late.

The practical lesson from all that has been said is, that we are now living in a state widely separate from nature. The working classes are least removed from natural law in this respect, and when they, as they sometimes are apt to, bemoan their hard fate that they must rise to work while others sleep, they may be quite certain, that they are doing what is most healthy both for the body and the mind, when they employ the early hours in useful pursuits, and need not consider it a penance to have the sun for their fellow-workman.



## CHAPTER XIV.

### FOOD AND DRINK, AND WORK.

**THERE** is a vulgar belief that in order to carry out hard work, mental or physical, a large amount of *highly nutritious* food is required by the worker. I

know of no idea so common, so wide-spread, and, at the same time, so exaggerated. There is of course truth in the notion, that for the body to work well it should be fed well; but good feeding does not mean large feeding, and it means anything except over-feeding. Of two men, one, what is called under-fed, that is to say, possessing just enough food to work upon and no more, and the other over-fed, the advantage both for work and for life is all on the side of the man who is said to be under-fed.

The rule to remember on this point is, that the body is only constructed to demand for its own necessities a certain limited amount of nourishment. If more be thrust upon it than it can bear, two mischiefs immediately arise. The first is, that the work it has to perform in disposing of the surplus of food or drink is so much work that ought to be at the disposal of the will of the person to whom the body belongs. That extra work done, without the will, by the automatic physical and chemical action of the body is none the less work because it is not directed by the mind. A number of organs are concerned in the extra work, all of which are hard-working organs. The stomach has to secrete more digesting fluid and to do more muscular work in churning the food. The absorption of the prepared food must be more extensively carried out, and when excess of the substance that has been absorbed is received into the blood, the heart must labour more actively to convey its charge into the structures which make up the body. These acts again imply more work, and on the part of the heart very much more laborious muscular work. After the food has been distributed, it has to be applied. A certain measure of that part of the food which is combustible has to be burned off, while that which is not so consumed is laid by as a deposit or as

fatty matter, ready, it is commonly said, to be used up again as fuel if the combustion of the body should fail from deficiency of heat-giving food, but often only to encumber the body by excess of fat. The flesh-forming material has to be applied, and the surplus of it to be eliminated by the kidneys and other secreting organs, which again means so much labour. Lastly, the watery part of food has to be utilized, and the excess of it has either to be borne away, with a further expenditure of power, by the skin, the lungs, and the kidneys, or to accumulate in the large vascular organs and the blood, and become a source of feebleness, grossness, and disease.

It is obvious from these facts that the person who takes an excess of food or of drink, though he may by an artificial system of life be what he considers enjoying himself, is in truth taxing the powers of his life for the sake of his enjoyment, and is of a surety bringing on destruction of his own vital career.

A simple diet is not only the cheapest but the best. It is considered by some foolish people a hardship to take brown wheaten bread; they like, or prefer to like, the white wheaten bread, because that is what the wealthy and well-to-do usually eat. The mistake is egregious. The white bread, if it be free of all adulteration, contains an extra quantity, in proportion, of the heat-producing or starchy food, and a reduced proportion of the flesh-forming substance. The brown wheaten bread, on the other hand, contains the whole of the flesh-forming substance, and if it be made without yeast, or other fermenting substance, the whole of the heat-producing matter also. Brown wheaten bread, in a word, contains as solid food all that is essential for life, and with pure water as *drink*, would of itself support life entirely for any

length of time and, *cæteris paribus*, under any labour. In prison fare this fact is fairly proved every day of the year.

I do not say these things to impose on any one the suggestion of prison fare. I am sure, on the contrary, that such a suggestion would be wrong and foolish, for nature has implanted in us tastes which call for variety, delicacy, and refinement. I only point out, as a matter of fact, how simple the necessity that has actually to be met is, and how little we need to trespass on our refined tastes for seeking additions to the necessity. We should, I mean, ever keep in mind what alone is required, and then we shall see how abundant and cheap are the luxuries with which we are supplied. The danger begins when luxuries lapse into necessities, and when we commence to lament our hard fate, because we cannot get the supposed necessities the moment we are inclined to ask for them.

I have said in another work that an adult man or woman ought never to take more than 30 ounces of mixed solid food in the day, and I repeat that statement here 30 ounces should be the maximum, 18 the minimum, and 24, or one ounce per hour, the medium.

In the taking of food there should be care to divide it in equal meals, so that too much be not taken at a time. Of all things a heavy meal should never be taken when the body is greatly fatigued, either from mental or physical exertion. We often hear men say, when they are busy, let us work on until we have finished and then have a thorough good dinner or supper. No practice can be worse. The digestive organs are as weary as the body is, before the task is done, and are not ready to undertake an excess of work, so that indigestion from

the extreme effort is an all but certain result. On the whole, the three best times for meals are, moderately early in the morning, say from seven to eight o'clock; at or about mid-day; and, about seven in the evening. At these meals the whole food of the day should be equally divided. To take a fair breakfast, a very hearty dinner or luncheon, and a mere tea in the latter part of the day, is a very bad practice, in fact, the idea of a chief meal at one time and a poor meal at another time is a grand mistake altogether. At each meal, as nearly as possible, all that has to be taken should be an equal part of three, so that the stomach, if I may so say, shall know precisely, each time, what it has to do, and by habit become prepared for its duty. The stomach is a tractable organ and soon learns the finest regularity if it be allowed to work with faithful regularity.

At each of these meals eight ounces of solid food is really the most that is required. For breakfast four ounces of bread with two ounces of bacon and two eggs, or the same quantity of bread and half an ounce of butter and three to four ounces of other animal food, such as fish or chop, form an ample meal in so far as solid food is concerned. For mid-day meal,—dinner or luncheon,—two ounces of bread, four of animal food, and two of potatoes, with a little fresh fruit,—an orange, an apple, or a pear, form a sufficient meal. For the evening meal,—dinner or supper,—a dish of milk and rice, or of wheaten porridge with bread and cheese, and afterwards again a little fresh fruit, forms a third and, again, amply sufficient meal. The man or woman who can obtain the food here named is not only supplied, but well supplied. By management, so as to change the vegetables and fruits with the seasons, persons so fed have even luxuries, and at a very small expense. To those who cannot afford so much for food as is stated

above, equally serviceable meals may be obtained by substituting lentils and rice very often for the expensive animal foods that have been specified.

It will be observed that I have said nothing as yet about drinks in relation to food. I have omitted drinks that I may speak of them separately. Drinks should be regulated and simplified as much as solid food. The largest quantity of fluid that is required by an adult person, barring the most exceptional circumstances of intense heat or exercise, is forty fluid ounces, or two pints, in the twenty-four hours. Some persons that I have known have subsisted comfortably on half that quantity, and I have met with a person who never drank any fluid at all, except what he got in fruits and juices of foods generally. Whether this is a good practice I cannot say, but I am sure that the majority of persons drink a great deal too much, and that when they exceed forty ounces they are pursuing an unwholesome course. The fluid, like the solid food, ought to be equally divided. Half a pint at each meal three times a day is an excellent division.

As to the quality of the drink, the one and only natural fluid, water, is all-sufficient really for every purpose, and they who swerve far from that true and natural standard drink are sure soon to go wrong to a greater or lesser degree. So long as a person is in health, whatever is called a stimulant in the way of drink is a certain injurious thing, a thing that cannot be wanted, and therefore worse than useless. It is true that when persons take what is called a stimulant in the form of ale, stout, wine, rum, gin, brandy, whiskey, and other similar drinks, they feel for a short time "lifted up," as they call it, as if they were capable of doing, for the moment, more work. The effect is delusive in respect to actual capability for work. The excess of pulsation and of overaction is so

much more work being done at the expense of the system, without any corresponding return of value received. The result is further exhaustion than has been produced by work itself, and soon a desire for more of the supposed artificial aid.

The experience of men who have worked under the most extreme of adverse conditions for work; conditions of cold, conditions of heat; conditions of fatigue from prolonged labours; experience, I repeat, under all these circumstances has shown and shows that the men and women who avoid the stimulants and trust simply and implicitly on the means which have been given to us for our natural support by the all-wise and beneficent Father, are the men and women who are able to endure most, and to perform most in the way of productive toil and skill.

There are certain other common drinks, which, in its own sense, may be called stimulants, but which are not intoxicating stimulants, and respecting which a word or two should be said. I refer to tea and coffee. I believe that both these drinks are superseded, in regard to usefulness of action, by cocoa and chocolate, and it is, I am sure, far better to breakfast and to sup with cocoa or chocolate as a beverage than with either tea or coffee. At the same time a moderate use of tea and coffee may without harm be indulged in once in the day. Neither should be taken in the place of water as any man, properly, and neither should be taken when the stomach is empty or full. But after a meal a cup of tea or coffee is commendable, and in such moderate doses of them taken tea is far better than any other stimulant. Of the whole, I commend cocoa and chocolate as the most valuable of the so-called beverages.

It has been said, when there is some great demand for food or drink, and the stomach is very weak,

nor is there any drink more pleasant than a mixture of tea, not very strong, and lemonade; it is a brisk, sparkling, and refreshing drink.

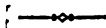
Tea may be indulged in too freely, however, and is so by many classes of men and women. Some men who are engaged in literary pursuits are given to take more tea than is good for them; and amongst the poor of the female sex the habit of taking tea at each meal is a habit that is most injurious. The excessive use of tea causes indigestion, giddiness, nervous derangement, and weakness, hysterical sensations, and a number of other symptoms, which if not permanently established, beyond the time in which the tea is taken, are for the time annoying and hurtful. Tea, therefore, should be accepted as a luxury and nothing more; never as a food and a true necessity of life.

In taking meals time should be allowed for the complete mastication of all solid food. Much of the indigestion which occurs amongst active workers is due to rapid eating, and what is vulgarly called bolting of food. A little ceremonial at meals is always good. The meal, however simple it is, should be taken in an orderly and leisurely manner, and with, for the moment, abandonment to the purpose of feeding. It is extremely bad practice to continue work into meal-time, or to study and brood over work while the stomach is requiring all the force it can command to accomplish its duties. Meal-times should be merry times. It is proper always to wash the hands and face before sitting down to any meal whatever. By this means the habit of cleanliness at meals is begotten, and the hands, being cleaned, can convey nothing to the mouth that may affect the food injuriously. Food should rarely be conveyed to the mouth by the hand direct, and even when bread is eaten, it is best to

convey it to the mouth with a fork ; but if it be necessary to use the hand, the hand should be specially clean. Those men who work with lead, and who suffer from lead colic, are in many cases poisoned from the lead on the hand which carries the food to their mouths.

*Food in seasons.*

A word has to be added before this chapter is closed in respect to difference of amount of food in certain seasons of the year. If the reader will refer back to the chapter on season in relation to work, he will discover that there are periods of the year when the body is naturally undergoing an excess of waste, and other periods when it is naturally increasing in weight. This is a fact to be remembered in respect to food. It is wise during the wasting period, beginning, as it will be seen, in the autumn, to increase the quantity of food taken, and to continue the increase during and a little after the period of waste. It is equally wise, when the increasing time is on, to reduce the amount of food. If the proportion of food taken by an adult be thirty ounces as a rule, it will be safe to take thirty in the wasting and reduce to twenty-four in the gaining period of the year.



## CHAPTER XV.

### ON TOBACCO IN RELATION TO WORK.

A GREAT many persons are of opinion that tobacco is a luxury which is conducive to comfort and efficiency in work of various kinds, mental and physical. *The man of letters* is accustomed to indulge in his

pipe as he ponders over the page that is before him. The artist fills his pipe as he takes his seat at his easel. The engineer blows his cloud as he studies some detail in mechanics. The artisan does the same as he works out details at the bench. The labourer takes his tobacco as he plods along in his routine way. The driver, the horseman, the boatman does the same.

Some men who smoke learn to indulge only in the so-called pleasures of the weed when their work is over; but these are exceptional men. As a rule, the smoker tries to believe that his favourite habit not only relieves him when he is tired, but helps him when he is at his employment, and so he resorts to it alike for relaxation and for aid.

On the whole, my experience is that men under all circumstances are a great deal better off in health when they do not learn the habit of resorting to tobacco for any purpose whatever. Tobacco begets many physical evils, and judging of those who do not smoke by those who do, I cannot see that it confers any single benefit on any one. If it did, the men of a country where smoking is practised only by men, ought to possess, from the habit, some decided and decisive mental and physical aptitudes over the women, which, as far as I am aware, is not the fact.

It is, however, better to test men who smoke by men who do not, and it is better still to compare the same man, when it can be done, at times when he was and when he was not a smoker. I have been able to make both these comparisons, and I am brought to one conclusion, and to one alone, which is, that the advantage is, in every respect, in favour of those who are not for any reason or at any season smokers.

The practice of smoking is less injurious to the body than that of drinking alcohol. It does not produce so much disturbance in the body, and it does not

leave such severe after-effects, such real diseases of the organs of the body. We cannot, however, defend tobacco on this score, except on the principle that two blacks may make a white; for although it is less hurtful, it is very hurtful. It keeps up a constant indigestion; it causes thirst, which leads to unnatural desire for drink; it deranges the nervous system; gives rise to palpitation and irregular action of the heart; makes the blood unduly thin; affects the sight; and renders the limbs unsteady.

For these reasons it is bad to resort to smoking either for laborious work, or for refined work, or for thoughtful work; and when a man feels that it is a necessity in the performance of any labour requiring particular aptitude, he may be assured that the sensation he experiences belongs to the habit, not to the nature that is in him, and is one of the most potent of all reasons why he should break through the habit and return to nature. To all workers I would say, if you do not smoke, do not learn; and if you do, learn to cease, that your work may be strengthened, and your body, which is your temple of work, purified.



## CHAPTER XVI.

### CLOTHING AND WORK.

I WISH not, in this short chapter, to speak of fashion. I presume that every man and every woman will dress according to the fashion of the day and of the class of society in which he or she moves. It is, nevertheless,

the business of the sanitarian to speak on the subject of dress in relation to health.

For all workers the dress worn should be loosely-fitting on the body, by which I mean it ought neither to compress nor to fall untidily at any point whatever. Unless it could be made of material as elastic as the skin itself, no tight garment could be worn that would be at once pleasant and free. In time the most unpleasant and wearying article of dress may become tolerable, and may even be missed when it is left off with some sense of discomfort. But that is the indication of habit, not of nature, and may be an indication of a great wrong. We see this fact proved in the use of stays or corsets by women. No worse instruments of evil were ever invented than stays or corsets. They spoil the figure, they impede the breathing, they embarrass the heart; and yet women who have worn them for a few months get so accustomed to them they declare that without them they could not stand erect nor feel properly supported.

Such artificial sensation is always to be deplored; and I dwell upon it at once because the resort to it is not confined to women. Men of different callings and different ages get into the habit of wearing belts for what they call support. They use a narrow belt for holding up their trousers; they use a broad belt to enclose their waists, by which they think they gain some direct advantage. They are entirely and painfully deceived. By tying in the centres of their bodies on this method they impede respiration or free breathing, they throw more work on the muscles of the abdomen and small of the back. Worse still, they limit the space of the abdominal cavity, and by producing undue pressure on the intestines, render the accident of rupture, to which so many

men—one man in every thirteen—are disposed, of easy accomplishment.

The dress should then be loose ; it should also be made of material that admits of free transpiration from the skin. All attempts to wear, as a regular thing, impervious and actual waterproof coverings are an entire mistake. A good large umbrella is worth half a dozen waterproofs. When the waterproof is covered with moisture from external wet, it is extremely cold to the body, and meanwhile the water exhaling from the body is prevented from its free escape. The body thus becomes wet through from its own moisture, and this condition, combined with the coldness of surface over the body, is extremely dangerous. Rheumatism, cold, and bronchitis are common consequences of exposure to danger of this character.

Against all extreme modes of crippling the body, whether the chest or the abdomen, too strong a protest cannot be offered, and a milder but still distinct protest requires to be made against other and lighter pressures. The firm pressure of a hat round the head is bad ; the firm pressure of the boot or shoe on the foot is bad ; the pressure of the garter, which always interferes with the return of blood by the veins, is bad ; the pressure of clothes which fit too tight at the joints or flexures of the body is bad ; the pressure of a tight shirt-collar or of a necktie is singularly bad, the pressure of strings and bands round the waists of women, to hold up their garments, is specially bad. In a word, the clothing should be at all parts of the body free of constraint, so that the muscles may have no obstacle to their easy and rapid movement.

The clothing of persons who are engaged at any kind of work should never be heavy, and should *always be warm*. Very thick clothing, thick cloth, or

woollen coats, thick, heavy guernseys, and thick flannel waistcoats and drawers are most objectionable. They are weighty, and therefore wearisome; they encase the body too closely, they interfere with freedom of motion, they check evaporation, and, worst of all, they absorb and retain large quantities of water, which they derive from the acid perspiration. Surrounding the body so charged, they clothe it in what may be called a wet blanket, greatly to the mischief of the wearer, who is thereby subjected to cold and rheumatism. Light flannel underclothing is good to wear, however, at almost all seasons, except, perhaps, in the middle of summer. In the winter the poorest working man will save by wearing light flannel. He will be protected by it from the exhaustion of cold; he will require less food in consequence, and he will be saved from disease, especially during the time when the natural wasting of the body is in active progress. For the well-to-do, silken undergarments are better than flannel. They are equally warm, they are much lighter, they absorb less water, and they maintain a more equable temperature of the body. In the long run, moreover, silk undergarments are really as cheap as flannel, for they are almost indestructible when they are of good quality. There is a texture which is a mixture of silk and fine flannel, which is also very good, and which answers for shirts equally well as for undershirts. On the feet socks are preferable to stockings, and strong but not tightly-fitting shoes or boots. Thin, bad shoes for either sex are really more dangerous than no shoes at all. Goloshes, which cover over but little of the upper part of the foot, are useful, though I doubt if they are really so healthy as the old-fashioned but now nearly obsolete French clog.

It has become too fashionable in these days to wear

the rough towel;—this is the process, the whole process, and nothing but the process that is really necessary for the best of cleansings. Such a bath can be taken in five minutes if it be practised every day. In summer and autumn the water may be quite cold; in winter and spring the water should not be lower in temperature than 90°, nor higher than 100° Fahrenheit.

I have nothing to say against the uses of other baths,—plunge-baths, shower-baths, salt-baths, and the like: they are very good; and a Turkish bath is a luxury which is as useful as it is luxurious. I commend it most strongly. But for the ordinary purpose of bathing for health's sake at all seasons and as a part of the discipline of life, the plain sponging I have described is the only needful act to carry out.



## CHAPTER XVIII.

### SPECIAL RULES FOR MENTAL WORKERS.

THE rules to be remembered with respect to mental labour are few and simple. They are to the effect:—First, that literary workers should content themselves with much less effort than mere physical workers, because the mental effort carries with it not a distributive labour, but a labour concentrated on one organ, and that organ the keystone of all the other organs,—the brain. Secondly, that regularity of habit, especially in regard to hours of sound sleep, absence from stimulants, and care in sustaining the body by good food, is an essential to the prolongation of health under literary exertion. And thirdly, that haste in

writing—sudden pressure, that is to say, on the organ of the mind—is specially to be avoided.

In addition to these rules there are one or two points which, though minor, are of considerable importance. In the act of composition, it is exceedingly useful to change the position of the body, to stand sometimes while writing, instead of invariably to sit, and frequently to take gentle exercise. It is also exceedingly good practice, when it can be done, to write to dictation; and I would advise every young writer to study this art until he is master of it. I know there are objections to dictation, and that Goldsmith, if I remember rightly, describes how much more glibly the words flow from the writer's own pen. But such objections are all removed by use, and when they are removed the advantage gained is very great. While dictating, the writer is free to use his limbs; in the act of speaking the chest expands, so that long-subdued breathing is rendered impossible. Moreover, a degree of physical exertion is procured which prevents the mind from becoming too deeply absorbed, which leads to a desire for rest of the body irresistible in its tendency, and which carries the mind, in spite of itself, into a condition favourable to its repose.

There is an unvarying sign telling that the brain has for the moment been overtaxed in literary work. That sign consists in the unnatural omission or the mis-spelling and misplacement of words in writing. The writer sits down to work, and after committing his thoughts to paper, he finds, on reading through what he has composed, that words are forgotten on which perhaps a sentence turns. Or he finds a simple word spelt incorrectly, one letter being used for another, as *v* for *f*; or he detects a verb before the noun, or a conjunction behind the nouns

which it should connect. He proceeds to revise, and comes to the spelling, and then he is in a quandary. How absurd it is!—but how is that word spelt? He turns to the dictionary, gets put right for the moment, but perhaps once more mis-spells the same word; and so on and on, in a vain striving after strength which is not in him, and which no external fillip can sustain. He is like a clock with a failing spring; he stops when he bids himself stop, but sometimes he stops without any such bidding. Nature, in short, is summoning him imperatively to one of two kinds of rest: immediate rest, from which he may rise recruited; deferred rest, from which he may never rise in this world.

The rule of conduct that should guide to a correct application in the matter of bodily exercise after mental work is sufficiently plain. The man whose mind is occupied during the day, and whose body has been at rest, requires exercise as an alternation, and he is better for it. But there must be this proviso, that, like the accomplished impersonator of living thought and passion, he overstep not the bounds of nature. Head-work in the main wears out the body as muscular work does, although the one can to a degree rest on the other, in the same way as with one arm that has been at rest the other can be relieved of work. But there must be method in the process, or all will go wrong; that is to say, there must be no muscular overstrain. If the major part of a working man's day is spent in mental labour, the remainder should be passed in muscular exercise that does not tire, but that does amuse. Carried beyond these bounds, the exertion debilitates; the candle is burning at both ends, and the light, brilliant though it may be, is of brief endurance. On the other side, a man who for ten or twelve hours is *occupied* in labours purely physical demands mental

occupation and bodily rest. He must sit and be fed with mental food. To send a man so placed out volunteering is to pile labour upon labour, and we know with what results; he may rest from the body on the mind, but in the act there must be moderation. Again, the occupation from which the relief is sought must not, in either case, extend beyond amusement, and at all events, it must not tire and exhaust. Nature herself, all-wise in her dictates and all open in her lessons, teaches us these truths in singular ways. Our mechanics' institutions in this kingdom are cases in point; they have failed for the obvious reason that they have called upon tired men to continue at work. The demand, too severe and exacting, like the conscription of a free people, has failed in its object, and will continue to fail until better and wiser counsels prevail.

In all cases where any of the premonitory symptoms of debility from mental overwork—especially sleepiness and melancholy—are felt, the drudgery of the work should be relaxed; and while inactivity on no account should replace the overwork, diversion should be introduced. This, which may be painful at first, is a necessity, and must perforce be carried out.

There should be a studied regularity in periods of rest, amusement, and labour; the hours of labour should not be greater than those of work and amusement, and diversion from work should always precede sleep.

Alcohols in all forms should be withdrawn, and smoking, if it is a habit, should also be stopped.

Meals should be taken frequently, but they should always be small; and sleep should never be sought during exhaustion from absence of food.

Personal cleanliness by the bath with brisk friction, daily, over the whole of the body, is an essential. But it is well to have the water tepid or even warm. Cold

produces a shock from which a feeble heart cannot easily rally.

In all cases change of scene, and gentle, firm, and cheerful companionship are to be sought at any price; without these the progression of the mental gloom is certain as the shadow of the night falling upon the earth. If, amongst the brokenhearted men and women who in this overwrought age abound in every place where life is most active; if amongst those who are hesitating whether it were best to live,

“Or to take arms against a sea of troubles,  
And by opposing end them”;

if amongst these, few or many, this book should fall, I would beg of them not to hesitate, but to place themselves under the guidance of a head that is clearer, and a heart that is firmer than their own. In such companionship they will find a support which is not moral alone, but physical also; a support that will supplement their own wants and weaknesses.

The golden rule, after all, is the rule of prevention. The lessons of this rule are for the young—lessons which should be taught in schools, but are not taught—that man throughout his life, from the first childhood to the second, is made for work, never for overwork; that it is not to his happiness to be idle at any period; nor, according to his organization, to do in one section of his cycle the allotted labour of the whole; that crush of work means crash of body; and that in the very height of manhood and industry the word “play” should never be forgotten.

## CHAPTER XIX.

## ON WORK IN EARLY LIFE.

IN considering the question of mental work some consideration should always be given to the amount of labour inflicted in the process of mental training while yet the mind is young. I will put down in the present chapter a few thoughts that occur to me as the result of experience and observation on this subject.

It is, I believe, a signal error to try to force all school teaching, so-called, on the mind while the mind is yet young. The acquisitions of knowledge by the mind require to be constantly revised in the progress of time; and that man is the profoundest scholar who subjects his thoughts and reasonings to the publication of constant new editions. If we grow up with something always before us—a town, a village, a church, or aught else—it assumes new proportions in “our estimate” every day of our lives. As the capacity of the brain enlarges, in fact, the picture painted upon it relatively diminishes, retaining always a proportion estimated by its own permanent dimensions and our fluctuating appreciations. If in our childhood we receive a picture of a village, a mountain, or a building, and then for many years are separated from it, bearing it only in our recollection, we are astounded, on returning to it again, to discover how little it is. Cobbett has beautifully illustrated this in one of his narratives of a re-visit to his native village after many years of absence; and the experience is common, I believe, to every one of us who are men. Things grow relatively smaller, in fact, as the mental surface increases. The first picture taken by the mind is long fixed in the memory. We are removed from it, but it

remains, and holds its place by the side of other subjects received later, and later still, until we return to it as an original picture, and receive it again. Then the new picture absorbs the older one, to our wonder and almost to our distrust.

I have applied this argument, as yet, only to learning from sight, but the same applies to knowledge founded on lesson, dogma, or inference. Between the purely physical and intellectual learning—between the demonstrable and the conjectural—there is, however, a wide difference with regard to after-consequences. The man who has formed an exaggerated child's idea of the size of his village church can correct this first impression by a new reference to the actual object; whereas, in regard to an opinion, he can make no such easy correction, owing to the difficulty with which the opinion is approached and the reasoning that leads up to it. Hence, if in early life a superstition becomes firmly fixed in the brain, it usually remains there—remains there to the exclusion of something better and wiser. It is in this way only that we can account—and in this way we can account readily—for the perversity, I had almost said, with which, in contradiction to maturer experience, we so often retain legends of the nursery. One of the ablest men I know, for example, who now receives incredulously all the mysticism of the supernatural, is still, in spite of himself, afraid of ghosts. A haunted house is to him a perpetual horror, for the simple reason that in his childhood the story of a so-called haunted house, and the stories connected with it, formed one of the most prominent articles of his daily mental food. In truth he had a haunted house with its attendant ghosts fixed on his little brain, and there it remains, and will remain as long as he has a working brain at all.

Another argument in favour of the line of instruc-

tion marked out above is, that the brain, even at its best, is only capable of taking in a certain measure of knowledge. Pressed too closely it has a tendency to become strong in one or two points only. It has, perchance, a natural aptitude for certain developments, and these, as a result, become all-powerful, to the exclusion of other faculties, which, had the cultivation been even and unforced, would have been also developed and brought out, leading to the formation of a vigorous and well-balanced intellect. I believe it will be found, without exception, that men of one idea have been overpressed children, who, finding it impossible to take in all that was tried to be driven into them, contented themselves at last with one object, and were lost to everything else; lost, I may say, without compunction, for if there is a living bore greater than another, it is he who knows but one thing. He is eaten up with conceit; despising those who are not up to his mark, sneering at those who are, jealous that he is not appreciated, and serenely indifferent to the best and noblest labours of humanity. The rudest child of nature—the most unlettered woodsman is a boon companion compared with the man of one idea.

The brain is a vast receptacle of external phenomena reduced to form, and its power as an organ may be considered as determined by its quantity, its quality, or both combined. That deficiency of surface is a sufficient cause for smallness of conception and development of intelligence, is shown clearly enough in the cases of idiots, and need not be further dwelt on. But that *quality* of brain, physically speaking, is of equal importance is not less true. While the brain is growing it is easy to learn, and unless the impression is very powerful or often repeated, it is easy to forget; when the brain is matured, to learn is

moderately easy and to forget is hard; when the brain has passed maturity, to learn is difficult, and to forget is naturally easy. All these variations indicate the existence of varying physical conditions of brain. In the young the brain outgrows, more or less, its own impressions; in the mature it retains them; in the past mature it rejects many impressions and retains few; at last neither receives nor retains.

In earliest youth, when the brain is in growth and rich in fluids for its nourishment, the changes of nutrition are quick, an impression is readily received, and is as readily reflected. In manhood the changes are slower. In old age, when the fluids are not so abundantly supplied, the pictured surfaces coalesce, and are obliterated and stamped out, while the formerly sensitive surfaces fail freely to receive.

The power of the brain to receive impressions—the quality of the organ in other words—shows itself in the capacity it exhibits for absorbing the external world. Quickness of perception indicates a brain ready and facile at absorption; dulness indicates smallness of the brain, or quality that does not receive. But in our present system we commonly treat both conditions as one; we spur on the precocious child because he is precocious, and we spur on the dull child because he is dull. In both cases we err; for when the mind is easily influenced, the danger usually consists in pressing the power too far, in making a show and wonder of what can be done; while when the mind is dull and stupid, it is filled to repletion before the earnest teacher is conscious of the fact, and is thus overburdened and worn by the pressure, but not instructed.

If any organ of the body other than the brain were concerned, this fallacy would be seen easily enough; *we should never think of working a sound and active*

eye into amaurosis, nor of subjecting a weak eye to intense sunlight; but when we have the brain to deal with, we commit follies equal to both these, and think we are performing an essentially good service.

In our walks through life how differently constituted do we find matured men! Of one man we say he has good common sense, but no accurate knowledge; he is trained to argument, but he lacks in comparisons, and the shallowness of information leaves all his pretensions stranded. That man has been taught to reflect before he was taught to perceive. Another man is all knowledge; reason and comparison in his case have lost their natural and developing power; he can remember endless things and facts, speak and read in various languages, make long calculations by strict rule, and astonish the world by his erudition. This man has been educated by the extremely forced artificial system, has laid no basis for comparison of natural things, but is proud in being "replete with thoughts of other men," and in having so much unassorted information buried deep in his intellectual arcanum.

Now and then—but only now and then, by accident as it were—we meet with the man who has learned on the natural plan, who has been pressed with no book-worship, and who has first acquired and then arranged his knowledge. Such a man, if his physical life has been equally well sustained, is the man of the day, a man who is sure to be pre-eminent, a keystone in that royal arch that is made up of knowledge and wisdom.

For the reasons given I have always persistently opposed the special prize system in schools and colleges. As a teacher with large experience, and as a student, I can recall no single instance in which noted

prizemen in youth bore away more than other men the prizes—that is to say, the successes of after-life. I have, however, known many, many times the successful prizeman in the class the least successful afterwards, and as often have known the most ordinary man in class come out as the best man in life.

Overwork in the child and in the youth defeats therefore its own object; it does not bring out the powerful brain necessary for the man; for all life is as a new and great lesson, and some young brain must be left free for the reception of lesson on lesson. Of this there need be no doubt, and there we may leave the first and leading fact; but the result of overwork unfortunately is not confined to the brain; it extends to the body as a whole. When the brain is overworked in the growing child, however well the child may be fed, there will be overwaste of substance in proportion to the excessive infliction of mental labour.

It is, in like manner, exceedingly bad practice to subject the young to anything like excess of physical labour. The condition of our children in factories up to the introduction of the half-time system was the most cruel evidence of the truth of this statement. Happily, the half-time system has remedied say half of an evil which once seemed destined to undermine the physical power of all the early, growing, developing life of the country. But though much has been done, a great deal remains to be done. It has yet to be understood that the period of youth in manhood and womanhood is a period in which all the natural force is required for growth of the animal body until the fully matured organization of body is completed, and that to see young children and youths employed, as we even now see them, bearing heavy burthens under which they falter; or kept at work at occupations which deprive them of their normal rest; or

forced to race against time in labour with hand or foot, is in each case a departure from natural ordinance, destructive alike of physical and mental power. A nation which uses up its powers in the days of its growth can never be a nation developed to perfect life.



## CHAPTER XX.

### ON THE REDUCTION OF SOME OF THE PHYSICAL INJURIES INCIDENT TO OCCUPATION.

THE rules of a general kind which have been stated in previous papers hold good in respect to all varieties of physical labour. We have, however, seen that in connection with the carrying out of certain kinds of physical work there are exposures to direct injuries which seem all but inevitable. In this respect the inevitable only *seems* after all. If those who are employed and suffer would exercise the same earnestness to avail themselves of the protective means placed at their command the greater part of the evil now so much deplored would pass away.

The injuries produced by mechanical concussions are not so easily remediable as some others; yet one or two of these, as I have already indicated, are the results of habit, and are entirely under the control of the worker.

The evils which arise from dusts, and which are the most telling, are nearly removable altogether, if the workers would be wise. The dusts, however fine and impalpable they may be, admit of being filtered from the air readily enough, so that the person who is exposed, if he would wear, with care and judgment, a

simply constructed filtering mask, would be saved from danger. Many masks for this purpose have been invented, and one which I invented myself, the "feather mask," is so perfect in its action that the finest flour will not pass through its meshes, although the air traverses it with complete facility. The mask is light, as easy to put on as spectacles, and so cheap that the poorest might have it if the demand for its construction on a larger scale were made. It has never been used, because it is not a fashionable or acknowledged system amongst operatives to wear masks. Mr. Baker, one of the inspectors of factories, has invented a crape mask, which answers well, and which I was once told was worn in the flax-spinning factories in Ireland with much benefit. But when I visited some of the largest of those factories in 1876, I never once saw the mask in use, and from what I could learn the objection against masks of all kinds almost prevented the hope of an acceptance of the most simple and most perfect that could be designed. Science in these instances is conquered by free will; her design is good, her power to carry it out abortive. She will have to wait until, by enlightenment of the masses, her true intention is detected, and her usefulness recognized.

To some extent the same teaching applies to those who are engaged in the manufacture of soluble chemical compounds. Those who work in lead can be preserved entirely from the poisonous action of the lead, by attention to cleanliness and by care that the poisonous matter shall not be conveyed from the hands to food, and so to the mouth. I met on one occasion with a dipper of pottery, who had been engaged in immersing pottery in the lead solution for thirty years, and who had never once suffered by the process. He attributed the immunity entirely to the

circumstance that he most thoroughly cleansed his hands before every meal, and took care never to take up food with his hands. He lifted bread to his mouth with a fork. This man gave me the most conclusive evidence, from his experience, that he and many others with whom he had worked escaped danger by such very simple and easy methods of precaution.

The dangers from which it is most difficult to escape are those that occur amongst workers who are exposed to the inhalation of noxious vapours. It must be admitted that immense reforms are demanded from those who have the management of the industries in which the dangers from these causes arise. Such an industry as that which exposes the workers to the vapour of bisulphide of carbon, and to all the subsequent miseries, is an industry which ought not to be legalized unless the danger could be removed, and in this country I doubt if it would be tolerated.

For improvements in these directions we must watch and wait. Science is old in fact, but young in the race of practical beneficence and desire to lend herself to the wants and means of happiness of the toiling millions. They therefore do not understand her when she speaks to them even with kind intent. As they learn more from her, they will trust her more, and the mutual understanding will be useful to both. At present she is proud that she knows so much, and the proud are both feared and disliked by the humble and weak. But as she descends to the lowly and lifts them up, both will be blessed, for the act will be mercy, which is twice blessed.

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